School Shop

vol. XXI no. 3

NOVEMBER 1961

Industrial-Arts Teaching and Guidance
by Ray and Peters

Training Electronics Technicians
by Paul B. Zbar

Challenge the Advanced Drafting Student
by Daniel J. Carnevale

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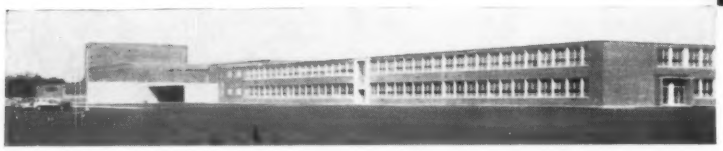

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November 1961 **Vol. XXI, No. 3**

Editorial and Business Office: 416 Longshore Drive, Ann Arbor, Michigan.

Manuscript Information: Manuscripts are paid for on publication and should be addressed to the Editor, School Shop, 416 Longshore Drive, Ann Arbor, Michigan.

Subscription Rates: $3.00 a year; Canadian, $3.00 a year; foreign, $4.00 a year. Single copies, 40 cents each except April which is 50 cents. Special group rates for students in teacher-training institutions will be given on application.

Publication Information: Published monthly, September through June, at Barrington, Illinois. Printed in the United States of America. Copyright 1961 by Lawrence W. Prakken. Member, Business Publications Audit, Inc.

Advertising Sales Offices:
Ann Arbor, Mich.—416 Longshore Drive, telephone Area Code 313 — 668-7205.
Chicago 45, Ill.—Didier & Broderick, Inc., 5809 Lincoln Ave., telephone LOngbeach 1-5284.
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Los Angeles 5, Calif.—The Jess M. Laughlin Company, 711 South Vermont Ave., telephone DUnkirk 3-7697.
San Francisco 4, Calif.—The Jess M. Laughlin Company, 465 California, telephone EXbrook 2-4050.

Postal Information: Accepted as controlled circulation publication and postpaid at Barrington, Illinois, and at Ann Arbor, Michigan.

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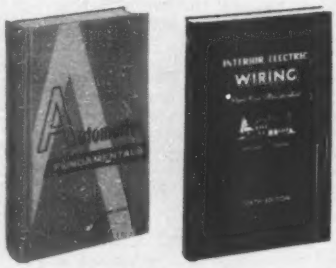

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

What Can Be Done?

In some places throughout the country there has been a tendency to cut down the time allotment for industrial education in the junior- and senior-high-school time schedule to make way for offering foreign languages or more mathematics or science courses.

The result has been the deprivation of the opportunity for many students who have the need and the aptitude and interest to take industrial-education courses when elective or even to cut down on the number of required courses in industrial education.

Much of this pressure has been due to the succumbing of school administrations to the importunings of the followers of Rickover and Bestor among the general public as well as the re-evaluation of the junior-high-school curriculum by professional educators in an effort to make it more academically challenging (or respectable) to pupils of ability. Regardless of the various factors, valid and otherwise, that have led to this situation, industrial education must defend itself, and well, in order to survive these local onslaughts. No doubt exists in our mind or in the minds of our readers, we are sure, of the value of good programs of industrial education, but how can the tendency to put the squeeze on for time allotments be met?

First, of course, the industrial-education offerings must be of top-notch quality to be worth defending. When this is the case, school administrators will think twice about reducing the time allotment for them, especially when parents are strong supporters of the program. There are some obvious earmarks of such programs: a carefully thought-out course of study which is actually used; high standards of pupil achievement; and content that has depth and covers modern industrial technology.

Second, school administrators should be well informed about the objectives and achievements of the industrial-education program in terms of student learning. Principals and superintendents should have copies of the course of study as well as evidence of what students have done and what they have learned while doing it. This evidence can take the form of case histories, class records, photographs, and projects themselves accompanied by student descriptions of learning accomplished. Written statements from local industrialists and parents are invaluable.

Third, other teachers, and especially counselors, should be as well informed, if not more so, about the objectives and achievements of the program as are the administrators. Ignorance among colleagues of objectives and accomplishments in industrial education is a serious problem that needs constant attention to secure better understanding.

Fourth, parents as well as professional educators need to know what is going on and what is accomplished in industrial-education courses. If parents want their youngsters to take industrial education and voice this request to school administrators, it will be heeded.

Fifth, do some investigating (or you can dignify it by calling it "research") to find answers to questions raised regarding the program by others in the school system as well as to inform yourself where you need answers. Questionnaires, school records, class records, counseling and psychometric records are all sources of information.

Sixth, when you have a strong program, ask for more curricular time. A good offense is the best defense. You can even suggest that the school day and the school year be extended. This would make it possible to add to industrial-education time as well as time for other subjects. Public and professional criticism of the short school day and year in most communities may well lead to some changes in the situation. You can prepare a list of what could be done with your program with more time to do it and present the list to the school administration.

In conclusion, there is little defense for a poor program of industrial education but there is plenty for a good one. Complacency and meek submission to time curtailments without rational counterbalancing arguments make it easy for industrial education to be shunted aside. The time for action is before cuts are suggested. Industrial education is an indispensable part of the school offerings. Something can be done. You are the one to do it.—*L.W.P.*

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(Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

A Shot in the Arm . . . .

Dear Sir:

I wish to take this opportunity to thank you for sending SCHOOL SHOP to me. I value and enjoy it very much. It gives a teacher a "sort of a shot in the arm" each month as it presents its new ideas, projects, and guidance.

Samuel C. Beeler,
Director of Mechanical Arts,
Grosse Pointe University School,
Grosse Pointe Woods, Mich.

About the "Proposal" . . . .

Dear Sir:

I read with much interest the statement made by Drs. Karnes and London in the February issue of SCHOOL SHOP relative to consolidation of the American Industrial Arts Association and the Industrial Arts Division of the American Vocational Association. I have always been a believer that there should be only one organization for the professional industrial-arts teacher. That is not only true in our profession, but it has also demonstrated effectiveness in other organizations. Possibly the most recent example we have had of consolidation of groups having similar objectives has been the combining of the AFL and CIO. I am sure those organizations realize the psychological effect as well as the strength of both groups pooling their best potential resources and leadership in each field, all working together for the realization of the best interests of the laboring man. We need to do likewise in the field of industrial arts.

I have found it somewhat difficult to explain to my administration a reason for the existence of two national organizations in industrial arts. It has been impossible for me to attend and participate in both of them. Neither have I affiliated with both of them because I do not believe in joining an organization just to become a member without participating in some of its programs. I have observed commercial exhibitors endorse this movement. I am sure with consolidation of our two organizations we will be able to plan better programs, unify and work toward realization of our objectives, resolve elements of confusion existing in the minds of the instructor and layman on terminology and objectives, and be able to reach and enlist more people in the total program of practical education.

Walter J. Robinson,
Professor of Industrial Education,
Northwestern State College,
Natchitoches, La.

Dear Sir:

I have read in a number of the industrial-education magazines the views of several of our outstanding men in the field concerning the merging of the American Vocational Association and the American Industrial Arts Association. There are probably a great many others who feel as they do.

I would like to state that I do not agree with them. For several years I belonged to the AVA, but finally withdrew my membership because I felt it offered me nothing. I still feel that it offers the industrial-arts teacher very little, but they seem very anxious that we join with them. If, after all these years of being together (as an industrial-arts section of the AVA), and they did so little, I question what would be done if we merged with them. It is my opinion they are interested only in the acquisition of members.

Let's take a closer look at the AIAA and the AVA. It is quite apparent that the AIAA must be more attractive to the industrial-arts teacher, or it would not have achieved the growth that it has. There was a need for an organization which would help the industrial-arts teacher. The AVA did not supply this need, and the AIAA was initiated. If a study were made of its accomplishments, it would be obvious that the venture was successful. Also, the AIAA is affiliated with the National Education Association, and for some reason (which is not known to me) the AVA is not.

True, it is difficult for many members of both organizations to attend each convention. My suggestion would be that both conventions be held at the same time, in the same city, with one exhibit area. Neither organization is so large that this would be an impossibility. Undoubtedly there are many problems common to each, but generally speaking, they are two distinct organizations, and they should be kept as such.

By no means am I opposed to vocational education. I very strongly feel that it is necessary in our educational program. What I am against, and will continue to oppose, is the vocational group's attempt to gain their own ends through the strength of the industrial-arts teacher.

All teachers are working toward a better educational program for our young people. This can be done by working closer together in our schools. But, just as mathematics organizations and science organizations are separate, and as the music organization is separate from the art group, I believe more can be gained by making the AVA and the AIAA two separate and distinct organizations.

Elmer J. Hemberger,
President, Industrial Arts
Association of Pennsylvania,
Chairman, Industrial-Arts Department,
Dowington, Pa., School District

Dear Sir:

The proposal by Professor Karnes and London in the February issue of SCHOOL SHOP was excellently presented.

The rather violent changes in American education as related to technological developments do not allow for small similar groups actually fostering the same objectives and generally composed of the same membership. The opportunities presented to the entire industrial-education field by the public desires for this type of education should be sufficient motivation for the joining of these two groups of professional people.

The form of self-analysis presented by the authors should also prevail in the over-all area of industrial education and its role not only in the current frame of reference but also in the dynamic years ahead.

I hope that your periodical will continue its support for candid comments and proposals which are made in the best interests of industrial education.

Louis Vrettos,
Dean of Vocational Education,
Southern State Teachers College,
Springfield, South Dakota

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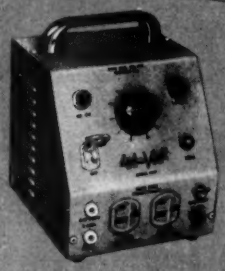

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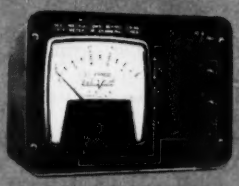

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Industrial-arts teachers have a built-in opportunity that favors application of guidance principles.

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Industrial-Arts Teaching and Guidance

By Willis E. Ray and Herman J. Peters

Assistant Professor of Education, Industrial-Arts Teacher Education and Professor of Education, Counseling and Guidance, respectively, The Ohio State University, Columbus

WITH the expansion and development of guidance programs in schools, there has been a great deal of writing and discussion about the teacher's role in guidance. Several research efforts have focused on the counselor as a person, attempting to identify and define the desirable characteristics of school guidance counselors.

On examining the material, the authors were impressed by what appears to be a similarity of values, means, and goals of industrial-arts teaching and guidance programs in the schools.

Time and again the point is made that focus on the individual is the very heart of the guidance point of view. Certainly, with the nature of their subject matter, industrial-arts teachers have a ready-made opportunity for a personal relationship with their pupils that teachers of other subjects would have to work hard to equal.

Another point encountered frequently in literature on guidance is that the individual counselor must know himself, the world of work, and how the two are related.

Clearly, the industrial-arts teacher has continuing, first-hand knowledge of happenings in the occupational world. Many have a background of experience in industry and business prior to the special training undertaken to prepare them to teach. And, not least, perhaps more than any other classroom teacher, the industrial-arts teacher has had opportunity to work with the academically and socially maladjusted child.

With his background before teaching, the nature of the subject matter, the training to teach that subject matter, the teacher-student relationship in industrial arts, and the students found in industrial-arts classes, the teacher of industrial arts needs only some training in guidance work, and he can be of immeasurable assistance to a school's guidance program.

It is apparent that the favorable relationship of industrial-arts and guidance has been noted by both industrial-arts teachers and school administrators.

While it cannot be documented in detail at this time, the authors believe that there is a substantial number of industrial-arts teachers moving into guidance work. One recent study that supports this belief reveals that approximately 5 percent of 1900 industrial-arts teachers in Ohio schools have some official capacity in a guidance program. Most serve as part-time counselors and some teach a course in "occupations." Also, many industrial-arts teachers take a master's degree in student personnel work and leave classroom teaching to work full-time in guidance programs of the secondary schools.

With the foregoing in mind, the following will present some basic principles of guidance and show how the industrial-arts teacher can take advantage of the relationship of his subject matter to these principles and thereby be effective in a guidance role in his normal classroom routine.

One basic principle of guidance is concern and sensitivity for the individual and his needs. There are many opportunities to apply this principle in the industrial-arts classroom. The teacher can observe each pupil at close range in a variety of situations. Is there a better atmosphere to provide for individual differences?

Through individual attention, the teacher can win the confidence of pupils who need and might wish to discuss their concern with problems of daily living. The permissive setting of the industrial-arts laboratory helps to establish the rapport which is the first requisite to successful counseling.

Another basic principle of guidance is the necessity of learning about the world of work so that a student can make a living to his satisfaction and be of benefit to society. Certainly, the industrial-arts teacher knows his way about the world of work.

Course content, at the introductory level and in control of a good teacher, is ideal for leading students in exploring that work world. Advanced courses are geared to extend and deepen the exploratory experience, providing the student with important information and understandings about industry and technology. Many college-bound youth develop keen interests for engineering and applied science careers while enrolled in industrial-arts classes.

Another basic principle of pupil personnel work is that every individual has a right to seek to live in peace and happiness. Because of their varied occupational backgrounds and special training, industrial-arts teachers have opportunities to encourage pupils to develop hobbies for worthwhile leisure-time activities. The contemporary work week

(*Continued on page* 22)

Training Electronics Technicians

By Paul B. Zbar
Director, Electronics Training, New York Trade School, New York

THE launching of Sputnik I startled this nation out of the complacent view that our technology was without peer. Out of this came an anguished self-evaluation with one conclusion of paramount importance to us in education: the need to update and upgrade scientific and technical education.

In 1953, long before the advent of Sputniks and Explorers, the Electronic Industries Association, mindful that the schools needed help to keep abreast of the rapid changes in electronics technology, undertook a program to revitalize training in this field. A grant was made to the New York Trade School to develop an educational research program to deal with the problem. The author of this article was selected to direct the program that had as its goals:

1. To evaluate the adequacy of existing curriculums in the training of electronics technicians.
2. To propose means for improving and updating training facilities.
3. To develop new training and instructional materials where needed.

Information about the publications that resulted from this study may be secured from the publisher, the McGraw-Hill Book Company, or from the Electronic Industries Association.

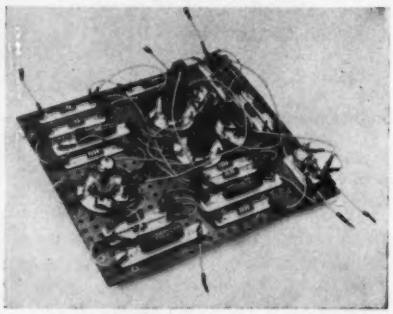
We should like to say a few words about the last of the series of publications which recently came off the press, *Industrial Electronics—Laboratory Manual for Electronics Technicians,* and the accompanying *Instructor's Guide.* This work was begun in response to many requests from educators for aid in formulating a curriculum and developing a laboratory program in industrial electronics. It succeeds in combining recommendations of industry with accepted educational precepts and sets up a standard of knowledge and skills based on industry's needs. The experiments in the laboratory manual help give the student an understanding of the basic circuits and their applications, the fundamental building blocks in industrial electronics technology. The instructor's guide features a detailed teaching outline, a reference list of textbooks, instructions for setting up a modern school laboratory with equipment, tool, and parts requirements.

We believe that *Industrial Electronics* will help provide a standard of training in the industrial field just as the other texts and manuals provide a standard of training in the communications field.

The Laboratory Program

The teaching of electronic science and technology is a demanding art. Difficult concepts must be communicated. The student technician must grasp fundamental ideas and must learn basic laboratory skills. Industry requires a technician with the ability to use modern equipment, to make circuit measurements, and to interpret his readings properly. These skills cannot be learned by a chalk-talk process. These skills must be learned by doing, in the laboratory, supplemented by painstaking instruction and demonstration in the classroom.

The EIA-New York Trade School study clearly indicated that schools needed help in setting up effective laboratory programs. Much of the electronics lab work which was being done was "busy" work on construction projects. The student spent hours soldering and building little devices. All too often he built from wiring layout diagrams rather than schematics. And when the project was complete he had little more basic understanding of electronics than he had at the start.



A breadboard work surface made with precision-drilled holes to receive the pins of parts and components. It is large and strong and can accommodate a whole experiment.

The reasons for these meager laboratory programs are clear. Many schools did not have the facilities or the capacity to set up a meaningful program. Teachers, concerned with their day-to-day jobs, were too busy to develop fundamental experiments, or to keep up with the rapid strides being made in electronics technology. Administrators, harassed by rising costs, closed their eyes to obsolete equipment and to third-rate labs. And so, the newest of the technologies never really got off the ground in many school shops.

We believe that the industry-recommended electronics-technology courses offer the solution to this problem. They set forth an up-to-date curriculum and a comprehensive meaningful laboratory program. The laboratory manuals provide a series of fundamental experiments in which emphasis is on basic understanding and testing using modern equipment. Each experiment is a complete unit and includes:

1. Objectives
2. Materials required
3. Introductory information, including a comprehensive discussion of the theory and practice relating to a specific job—basic principles are explained,

A sample of a component that fits in the precision-drilled holes of the work surface.

techniques in the use of specific instruments are given in detail.

4. Detailed procedure in which the student is directed at every step. Sample tables are provided for the student to follow in recording his data and results.

5. A series of related questions follow each experiment.

The Laboratory Method—Breadboarding Kits

Breadboard experiments replace the "building" projects. Solderless circuit boards are used in performing the prescribed jobs. The student can set up simple or complex circuits quickly on the circuit board without any soldered connections. The time thus saved is used in directed measurements and circuit analysis. Components can be changed quickly and their effect on circuit operation noted. New circuits can be designed and tried out, and changes made rapidly. Component parts can be used over and over again. The resulting savings are of course an important consideration to an administrator concerned with the educational budget. Investment in a well designed breadboarding system is sound economy. What are the characteristics of a good system? Let us consider them.

1. The pegboard matrix on which the circuit is wired must be strong enough and large enough to support an entire experiment.

2. Each component must be individually mounted to insure ease of use and to prevent costly duplications.

3. The system must insure positive connections between components, which will not break in the normal course of the experiment.

4. Each of the components must be physicaliy rugged and must meet the electrical specifications set forth in the instructor's guides. Underrated components invite constant breakdowns and replacements. Too much valuable teacher and student time is lost hunting down defects arising from "bargain" parts.

5. Exact parts as specified in the instructor's guides must be provided. Anything other than exact values may require modification of the experiment, with resulting confusion and degrading of the system.

The manufacturer of the commercially manufactured breadboarding device intended for use with the EIA-New York Trade School Laboratory Manuals should provide an itemized list of components which may be compared with the recommended list. A listing of parts required for the jobs in the *Industrial Electronics Manual* is included here for your information.

6. Matched parts, where specified, should be provided. For example, in the properly designed superheterodyne receiver, matched parts are required for the antenna coil, tuning capacitor, oscillator coil, and i-f transformers.

7. A sufficient number of durable leads of various sizes must be provided to insure an efficient layout of the experiment.

8. A source of replacement parts must be available for components lost or for those components which may become defective in the normal course of use.

9. The breadboarding kit should provide for proper storage of the individual components. It should be possible to locate parts quickly and to return them to their location just as readily. The "package" approach to breadboarding kits is an efficient one for school use and minimizes the amount of stock-clerk time required for handling components.

Component Parts Required

Parts requirements for the courses in basic electricity, basic electronics, basic radio, and radio-receiver servicing are fairly well known since they are contained in the Instructor's Guides for this series, published several years ago.

Not so well known are the parts requirements for *Industrial Electronics*, just released. These are listed here to help you evaluate what you will need to offer this course.

An examination of the list of required parts reveals such items as synchro generators, motors, and other rotating machinery. Machines cannot be considered as breadboard components. Nor can these bulky components be contained in a circuit board kit. They are needed nonetheless, and some provision must be made for their procurement. A circuit-board-kit manufacturer may well provide these as optional items.

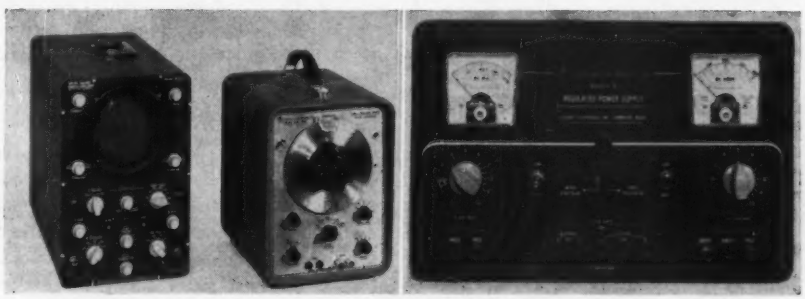
Our experience at the New York Trade School indicates that an effective laboratory program can be achieved by students working in teams of two. In the case of experiments involving rotating machinery though, a greater number of students may be teamed together. For these exceptional cases, two, or possibly three teams of two can be combined into a single work group. This fact should be considered in procuring rotating components for the industrial electronics laboratory.

Equipment Requirements

In the laboratory, the student must learn how to use instruments for tests and measurements and in circuit analysis. He can acquire these fundamental skills by working with up-to-date test instruments, the instruments that he will use in industry. This is a basic concept which we, who are entrusted with the training of electronics technicians, must accept.

In setting forth test-instrument requirements, we have categorized the equipment as "fixed" or "roving." In the fixed grouping are the common instruments which the student uses in his day-to-day jobs. These should be available at every test station and are usually mounted or fixed on the test bench. The roving equipment is housed in a central stock room and is requisitioned by students when needed in a specific experiment. (*Continued on next page.*)

From left: A wide-band oscilloscope, a sine-square wave signal generator, and a regulated power supply, three test instruments vital to an electronic-technician training program.



They are not cat's, but rather they are

Fixed Equipment

Every test bench should have one each of the following:

1. *Oscilloscope.*—A modern, high-gain oscilloscope is recommended. It is desirable that the oscilloscope have both a calibrated vertical step attenuator and a vernier attenuator. This combination simplifies the calibration of the vertical amplifiers.

For basic electronics an oscilloscope capable of displaying a-c signal waveforms is sufficient. However, for industrial electronics the oscilloscope must be capable of showing both a-c and d-c phenomena. Moreover, for ease in showing phase relations in the industrial-electronics experiments, it is desirable that the oscilloscope have facilities for "line sync" and phasing.

2. VTVM.

3. VOM — 20,000 ohms/volt sensitivity.

4. Audio-frequency generator. Low impedance, low distortion, sine-wave output. A combination square-wave and sine-wave generator can be used to meet the needs of a square-wave generator called for under roving equipment.

5. D-C power supply. A regulated power supply is desirable. It should furnish the following: (*a*) 6.3 volts ac, isolated, at 3.5 amp; (*b*) regulated positive d-c voltage variable from 0 to 250 v at 150 ma; (*c*) negative d-c voltage variable from 0 to 50 at 10 ma.

Roving Test Equipment

Roving equipment is housed in the stockroom and may be signed out by students when required. The list of equipment below indicates the suggested quantity, based on the number of test benches in the lab.

1. Milliammeter — one for each bench, 0-1 ma. (50 m-v movement) with 10, 20, and 100 ma shunts.

2. Tube tester—or combination tube and transistor tester; one for every five benches.

3. Capacitance tester—one for every five benches.

4. Selenium-rectifier tester — one for every five benches.

5. Square-wave generator — one for every five benches; as previously suggested, a combination sine-wave and square-wave generator can be used.

6. Oscilloscope voltage calibrator — one for every five benches, for those oscilloscopes lacking internal facilities for voltage calibration.

7. A-m signal generator, covering the broadcast-band frequencies; one for every two benches.

8. Stroboscopic tachometer—equivalent to General Radio Type 1531-A, or tachometer capable of showing speed changes up to 20 rpm, in range 600 to 2,000 rpm (approximately), one for every five benches.

9. Wattmeter — one for every five benches.

10. Transistor tester—one.

11. Variable auto transformer — one for every bench.

Demonstration Test Equipment

A complete complement of equipment should be set aside for theory demonstrations, duplicating every type of fixed and roving equipment.

Spare Equipment

The well-equipped school will provide approximately 10 percent extra equipment as spares to replace equipment temporarily out of repair.

Communications or Industrial Electronics

The industry recommended courses in electronics are intended for the training of technicians both for the communications and for the industrial-electronics fields.

Unless extra time is added to the usual time alloted to the course of study, it is unlikely that the student can complete comprehensive training in both fields. It may well be that an increase in time is desirable. Where it is not possible, the student must decide which area of specialization is of greatest interest to him and must complete the requirements for that specialty.

Common Courses

Before branching off into his specialty, the student must complete certain courses that are common to the training of both types of technicians. These common courses are basic electricity and basic electronics. Instruction in these courses should include a comprehensive laboratory program as recommended in the *Instructor's Guide.*

Communications Specialty

This specialty requires comprehensive instruction, including a complete laboratory program in basic radio and basic television. In addition, the student should be offered nonlaboratory courses in a-c and d-c machinery, industrial electronics, microwave techniques, and radar principles.

Industrial Electronics Specialty

This specialty requires comprehensive instruction including a complete laboratory program in a-c and d-c machinery and industrial electronics. In addition, the student should be offered nonlaboratory courses in radio and television-receiver principles, microwave techniques, and radar principles.

A Complete Course of Study in Industrial Electronics Technology at the Technical-Institute Level

In our analysis of training requirements, we have been concerned only with courses in electricity and electronics. But modern industry requires technicians who are well versed in mathematics and the related sciences, who understand the history and economics of the world they live in, who can relate to others, and who can communicate with others. The curriculum for the "complete" technician in industrial-electronics technology, at the technical-institute level might well include the following:

First Semester

Basic electricity—d-c and a-c
Industrial electricity
Trigonometry
Mechanical drawing
Technical report writing
Economics and government
Physics I

Second Semester

A-c and d-c machinery
Advanced algebra
Electrical drafting
Public speaking
World history
Physics II

Third Semester

Basic electronics
Analytic geometry
Electronics drafting
Principles of psychology
Mechanics
Machine shop practice

Fourth Semester

Industrial electronics
Radio and television-receiver principles
Introduction to differential and integral calculus
Microwave techniques
Radar principles
Human relations
Electronics design project

Summary

In this article we have considered the elements of an industry-recommended program for the training of electronics technicians. We have indicated that under industry sponsorship complete educational packages have been developed and are available for the use of technical and vocational schools. These packages include texts, laboratory manuals, and detailed instructor's guides.

We have emphasized the importance of an adequate laboratory program in the training process. The laboratory manuals developed to accomplish this end are detailed and complete. The laboratory process is an experimental one in which the building blocks of

(*Continued on page* 18)

They are not cat's, but rather they are

Metal Whiskers

By Alfred A. Lease
Professor, Industrial-Arts Department, St. Cloud, Minnesota, State College

THE history of scientific discovery is well marked by the part that ironical twists of fate have played in revealing new things which might otherwise have taken centuries to uncover, if even then. So, necessity is not necessarily always the mother of invention, but inventive alertness, coupled with an insatiably curious mind will ultimately culminate in progress and invention of almost any type. And, so it was with the discovery of iron whiskers that have tensile strengths of 1,900,000 psi — more than 50 times that of iron, more than four times the tensile strength of the toughest steel wire known to man. Fantastic? Yes and no, but let's go back and review this discovery.

The story began in 1948 at the Bell Telephone Laboratories where engineers puzzled over equipment which had mysteriously developed short circuits. Laboratory analysis of the troublesome components bared no secrets. Scores of fruitless tests followed each breakdown, until one day a sharp-eyed engineer, a high-powered light, and a microscope teamed up to solve the difficulty. A metallic whisker bridging a gap of 3/16″ was the culprit. More tests revealed the willowy, light-reflecting, many-sided whiskers to be less than eighty-millionths of an inch thick.

Industrial scientists at General Electric, United States Steel, and Westinghouse, together with men from the Bell Laboratories, started wondering about the origin of these tiny, crystalline growths. Many hypotheses followed, but further tests proved them wrong. After more than 3,000 metal specimens were studied, the mystery remained.

But certain facts also remained.

One: The metallic whiskers grow on many metals both plated and unplated. Cadmium, tin, and zinc head the list. Ironically, these are the same metals most used in plating electrical components where short-circuiting could result. Some metals, such as copper, do not grow whiskers under normal conditions, but whiskers do appear on metals while in the presence of sulfur, such as that found in the rubber of electrical insulation.

Two: The whiskers grow at rates ranging from almost no growth during a period of several years, to 1/5″ in one year. Above 250°F growth of the whiskers stops. Below —40°F growth continues but at a delayed rate. Coating the metals with wax and lacquers failed to deter the growth, as did complete immersion in oil.

Three: Perhaps the most promising discovery evolving from the metal whiskers is the theory of interatomic forces. Scientists, such as those at Westinghouse, who are experimenting with the tiny crystals, believe a whole new concept of the atomic structure of metal is ready for unveiling.

In essence, the discovery amounts to this: When iron is freed of the limitations forced on it by imperfections and impurities, the interatomic forces give iron a strength of about half a million pounds per square inch. Ideas are beginning to form regarding the "glue" or atomic forces which cause the iron atoms to cling so tightly together.

This strength is attributed to the near perfect crystalline structure of the whiskers. The perfectness of the iron atoms and their distribution within the piece as a whole determines its toughness. Ordinary iron has imperfections in these atoms and their molecular arrangement. Roughly it is comparable to the relative fragility of a pair of pliers cast from steel and the toughness of a pair which has been forged. Of course this is not a true simile, but it permits an opportunity to draw a comparison.

The theories growing out of the research work currently taking place may unshackle a totally new understanding of the reasons for the metal failures known as "stress-corrosion cracking." These failures occur in metal structures which chemically corrode while subjected to a stress, either internal or applied. Complete structural failure can result in such things as turbine blades, stainless steel pipes, and cooking utensils. It is believed stress-corrosion cracking can be triggered by corrosive elements as simple as the deposits from human perspiration. This research could conceivably lead to the control of metal corrosion, which is costing American industry an estimated annual replacement cost of $5,500,000,000.

If this research proves fruitful, the gateway to supermetals and their alloys is at last ajar. Who knows what tremendous metallurgical possibilities lie in the wake of the new discoveries. Lighter, stronger, more durable metals may change the entire design of industry.

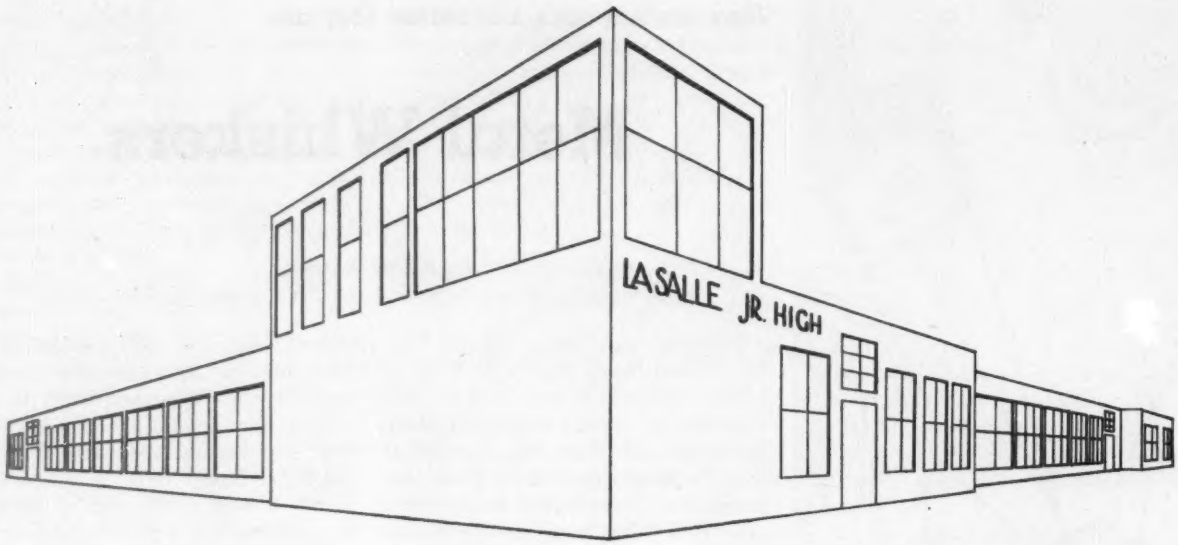
In any event, the mixed blessing continues. With the electronic age just barely launched, the metal whiskers must be controlled. The consequences of otherwise endangering billions of dollars worth of electronic research and fabrication cannot be tolerated.

On the other hand, new manufacturing techniques and problems demand newer, stronger, and lighter metals. Finding the secret harbored by nature, so that its processes may be duplicated by man, promises us metals with strengths undreamed of even during moments of man's fondest wishfulness. Finding this secret will most certainly be a giant step forward in the revealing of the secrets of metallurgy. ★

After a number of such meetings and

The learning situation was definitely

5. Guidance in vocation: After the



LA SALLE JR. HIGH
Drawn by DAVE GLEASON
Checked by DJC

Here is one way to

Challenge the Advanced Drafting Student

By Daniel J. Carnevale
LaSalle Junior-High School, Niagara Falls, New York

WHAT should we teach our advanced pupils?

This question is one which, especially in this atomic age, has confronted many industrial-arts and vocational educators. There have been many answers. I would like to suggest a project that was undertaken by one of my advanced 9th-grade groups at the completion of their regular work in mechanical drawing. It seems to have the earmarks of being a promising educational device, combining interest, skill, ability, and planning.

The situation which I drew on for the initiation of my project exists now in many school systems. Because of a growing school population, a new junior-high school will be needed in the near future to accommodate the educational needs of just about any community as well as our own. With this as the theme, I presented the problem of drawing *our* concept of a new junior high. It was explained briefly that the actual detail drawings would be too complex for our undertaking. As a result, it was decided that two drawings would be required per pupil: a floor plan and a pictorial presentation. This venture was received enthusiastically. Much in the way of research had to be done before any attempt was made to start the drawings. Time was against us. We allowed approximately one month, five periods per week, plus any after-school time.

First, the administration had to be approached, and the number of pupils the school would house had to be estimated. From this point, we had to move on to a survey, by the class (either singly or in groups) of: (1) class size, (2) square footage per pupil, (3) special apparatus required. Other similar kinds of information were accumulated either from subject teachers, state pamphlets, or other qualified sources.

The number of students to be housed, suggested by the school administration was 1,200, but through class discussion, a more economical suggestion was made and accepted by the group: The primary structure was to accomodate 800 pupils with the possibility of adding future rooms for a total of 1,200 pupils.

After a number of such meetings and with the aid of data at hand, we decided the following number of subject rooms were needed for 800 pupils.

Rooms	*Number*
General Rooms (Eng., math., etc.)	27
Science	4
Mechanical Drawing	1
Wood Shop	1
Print Shop	1
Electric Shop	1
Machine Shop	1
Sewing Room	1
Cooking Room	1
Art Rooms	2
Gyms (dressing rooms and office)	2
Auditorium	1
Cafeteria and Kitchen	1(each)
Main Offices	2
Guidance Office	1
Clinic	1
Book Rooms	3
Library	1
Boys' Lavatories	3
Girls' Lavatories	3
Music Room	1
Teachers' Rooms	2

The learning situation was definitely not confined to mechanical drawing but rather covered a diversified cross section of general areas, thus adding to the education of the student.

What did we gain in this venture?

1. Basic concepts of architectural drawing: Depicting walls, doors, and windows. Exposure to the understanding of some problems of stress and strain and fundamental floor layout.

2. Mathematics: Problems of allowing enough square footage per pupil in each subject area and placement of the rooms of the building.

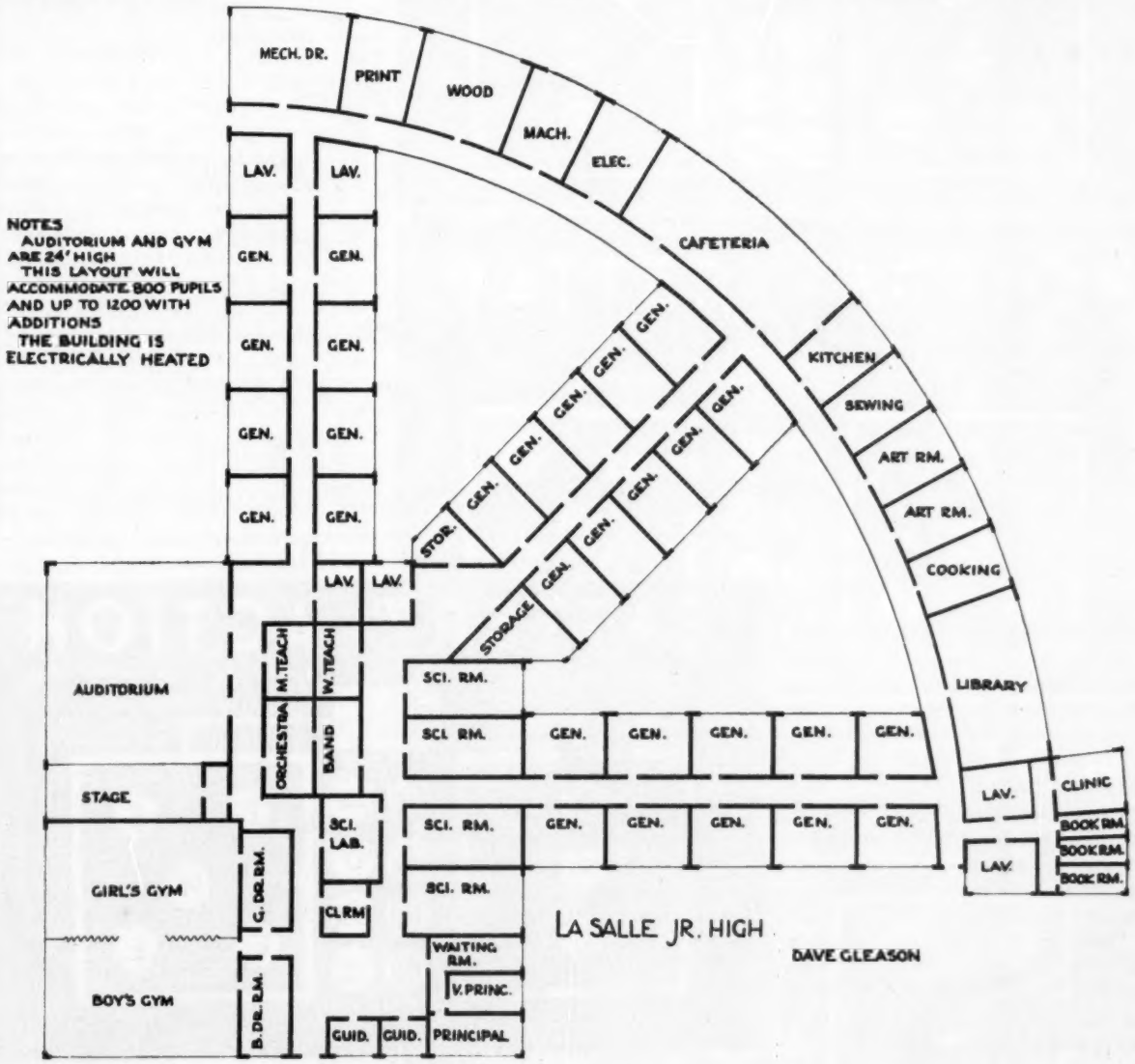
3. Public relations: It was noticeable that not only were the pupils interested but their parents were also, as reflected through their sons' comments.

4. Teamwork: Embarking on the research was no easy task. This required a great deal of organization and close teamwork, accomplished basically by the students.

5. Guidance in vocation: After the fulfillment of this project, the boys understood more fully some of the problems besetting an architect as well as knowledge of the many interesting situations encountered. Many students displayed a direct interest to follow up this project with more drawing in the upper grades and possibly, even, architecture as a vocation.

6. Appreciation of financing: Cost of individual items such as desks, benches, tables, chairs, etc., were not stressed. Price of construction per square foot and methods to cut costs, but still maintain a full school, were discussed frequently. Interest and ideas were plentiful in this area.

I personally think a project such as this with real meaning did more than a number of extra orthographic or pictorial drawings. The project not only stimulated a desire to work but mainly served to promote real learning. ★



plied billions of times, creates a surplus

BATTERY ACTION

A teaching aid for illustrating

Battery Chemistry

By John D. Ehrenborg
Assistant Professor, Los Angeles, California, State College

THE relationship of chemistry to the automobile becomes a teaching "natural" in the area of the lead-acid storage battery. As a teacher, I have tried numerous ways to illustrate the principle of the chemical interaction in a battery and found most of these techniques lacking in adaptability, visual imagery, and simplicity of use. Using a magnet board, however, as illustrated in this article, allows the teacher much freedom in the teaching process. The battery board is made of metal and the various components of the discharge-charge cycle are mounted on magnets so that the teacher can move through the process logically, one step at a time. Thus, the chemistry of battery cycling can be understood easily by high-school and college students.

The presentation should be prefaced by a discussion of battery nomenclature, materials, and construction. Charts, filmstrips, models, or other aids are very effective for this portion of the lesson.[1] After the students understand the basic fundamentals of the lead acid battery, the teacher can prepare them for a lesson in battery chemistry by explaining the chemical symbols and the formula involved in the cycle. The author has found that by writing the words and symbols together with the formula on the blackboard, the students are able to keep each term in proper perspective (Fig. 1).

After the basic steps have been understood, the teacher can use the magnet board to show visually how the chemical interaction functions. To keep the presentation as simple as possible, the minimum number of molecules are used. They are as follows: 1 each, lead—Pb; 1 each, lead dioxide—PbO_2; 2 each, water—H_2O; 2 each, sulphuric acid—H_2SO_4.

A charged cell is illustrated (Fig. 2) with this minimum number of molecules.

It is not the intention of this article to teach the chemical process in the battery. The author, therefore, for the sake of brevity, will cover the cycle only as it relates to the use of the magnet board. A review of a college chemistry book would prove helpful if the total process of battery action is not understood.

The Discharge Cycle

The first step is to move the sulphate ion in proximity with the lead plate. The positive lead ion attracts the negative sulphate ion to cause a bonding, freeing two electrons as a result of the interaction. The two electrons thus freed can be moved to the terminal of the negative plate. This process, multi-

Fig. 1

Lead=Pb
Sulphuric Acid=H_2SO_4
Oxygen=O
Water=H_2O
Sulphate=SO_4
Hydrogen=H_2
Lead Dioxide=PbO_2
Lead Oxide=PbO
Lead Sulphate=$PbSO_4$

Fully Charged Battery:
Negative Plate=Pb
Positive Plate=PbO_2
Electrolyte=H_2SO_4 plus H_2O

Fully Discharged Battery:
Negative Plate=$PbSO_4$
Positive Plate=$PbSO_4$
Electrolyte=H_2O

CHEMICAL FORMULAS[2]

Discharge

Positive Plate:

1. $PbO_2+2H^++2e^- \longrightarrow PbO+H_2O$
2. $PbO+H_2SO_4 \longrightarrow PbSO_4+H_2O$

Negative Plate:

1. $Pb+SO_4^= \longrightarrow PbSO_4+2e^-$

Electrolyte:

1. $2H_2SO_4+2H_2O+2O^= \longrightarrow 4H_2O+2SO_4^=$

Charge

Positive Plate:

1. $PbSO_4+SO_4^= \longrightarrow Pb(SO_4)_2+2e^-$
2. $Pb(SO_4)_2+2H_2O \longrightarrow PbO_2+2H_2SO_4$

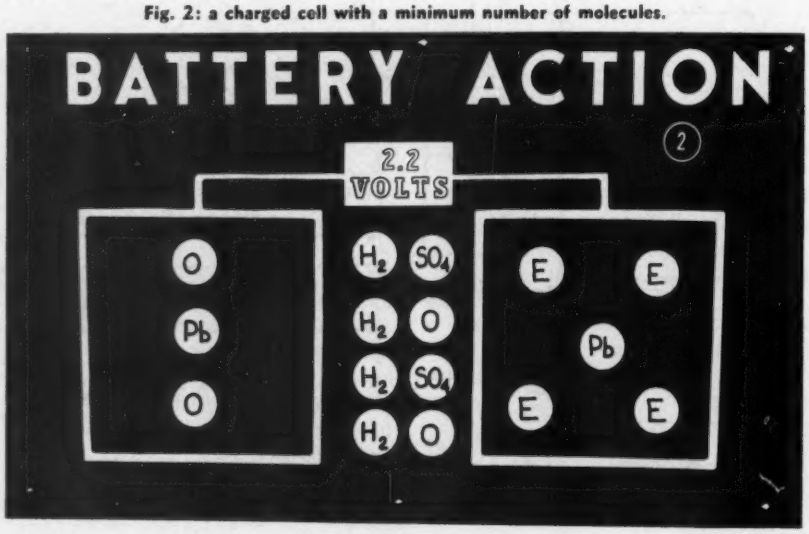
Negative Plate:

1. $PbSO_4+2H^++2e^- \longrightarrow Pb+H_2SO_4$

Electrolyte:

1. $4H_2O+2SO_4^= \longrightarrow 2H_2O+2H_2SO_4+2O^=$

Fig. 2: a charged cell with a minimum number of molecules.



[1] "Facts About Storage Batteries," Filmstrip Kit. Educational Film Division, Exide Automotive Division, The Electric Storage Battery Co., P.O. Box 6266, Cleveland, Ohio.

[2] Holmes, Harry N. *College Chemistry*. New York: The Macmillan Co., 1947.

plied billions of times, creates a surplus of electrons at the negative terminal causing an electrical potential (Fig. 3).

By placing a load in the circuit, the two electrons are able to move through the circuit (turning the starter motor as an example of a load) and deposit themselves on the positive plate. As two hydrogen ions are available from the splitting of the sulphuric acid molecule, a bond takes place between the oxygen ion and the hydrogen ions to form water. The two electrons from the negative plate replace the oxygen ion to form a molecule of lead oxide on the positive plate (Fig. 4).

As lead oxide reacts readily with sulphuric acid, the sulphate ion easily displaces the oxygen and forms lead sulphate on the positive plate. The oxygen ion bonds to the hydrogen ions to form more water. Figure 5 illustrates this.

The battery is completely discharged now with lead sulphate on both plates and water in the solution.

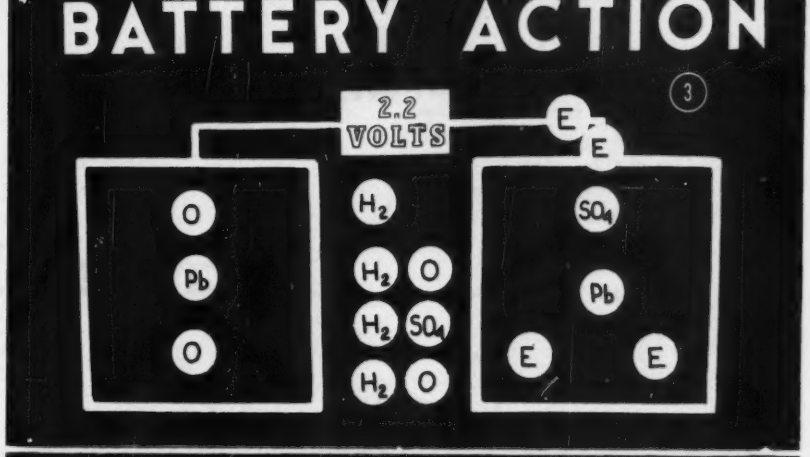
The Charge Cycle

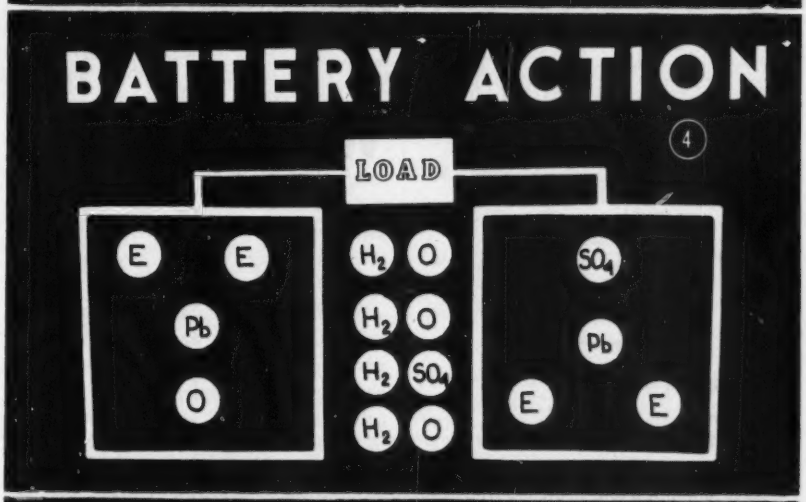
By placing a generator in the circuit, the process can be reversed. The two electrons on the positive plate can be removed from the lead sulphate and returned to the negative plate as the lead sulphate ionizes on both plates as a result of the generator current flow. The sulphate ion on the negative plate combines with the hydrogen ion in solution to form sulphuric acid. The lead ion plus two electrons forms lead on the negative plate. The hydrogen ion in solution combines with the sulphate ion from the positive to form sulphuric acid in the electrolyte. The lead ion on the positive plate combines with the oxygen ions to form lead dioxide on the positive plate. As the charging current causes electrolysis to take place, the extra molecule of water can be shown to be released as hydrogen and oxygen gas—explaining the reason for the need to add water to the battery. The recharging step is shown in Fig. 6.

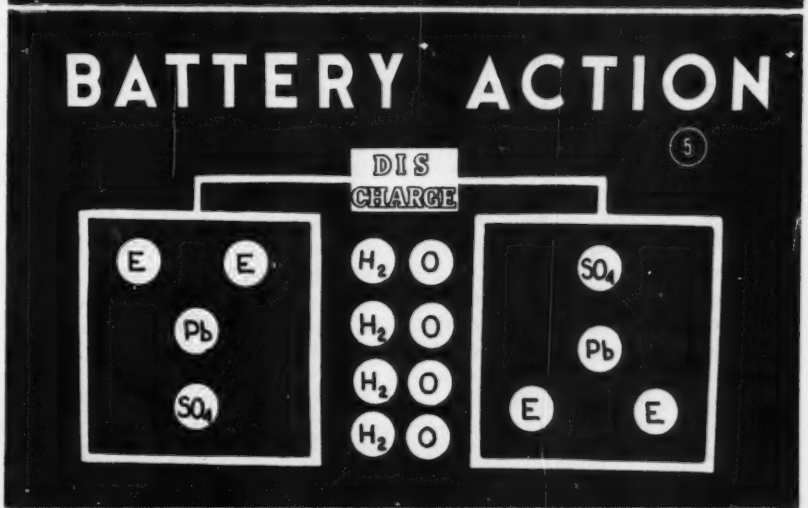
The completely recharged battery is illustrated, too (Fig. 2).

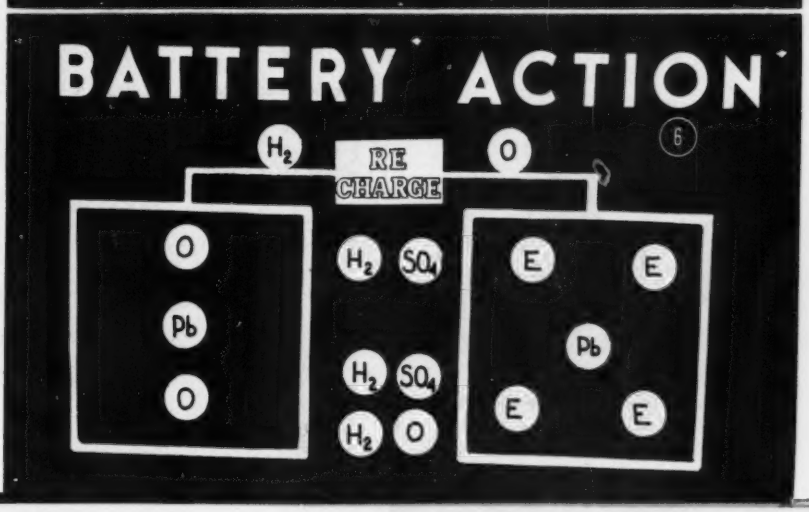
Conclusion

The advantage of the mobility of the various components of the chemical interaction is selfevident in this visual aid. The author finds that students will use the board as a puzzle to see if they can









From top to bottom at right: Fig. 3—a charged cell with the electrons gathered at the negative terminal; Fig. 4—a partially discharged cell; Fig. 5—a completely discharged cell; Fig. 6—a recharged cell with hydrogen and oxygen escaping due to electrolysis.

"discharge" and "charge" the battery. Student interest in the chemical process and related areas is intensified, and the process of introducing chemistry into the industrial-arts classroom thus becomes a teaching natural.

Bill of Materials

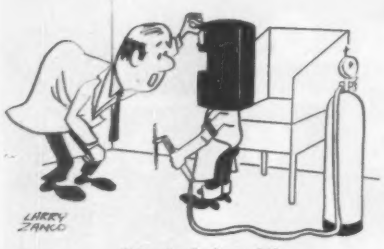
No. of Items	Item	Size
1	Metal-covered ¼" plywood	14"x18"
2	Dowel with symbol Pb	1"
4	Dowel with symbol E	1"
4	Dowel with symbol O	1"
4	Dowel with symbol H_2	1"
2	Dowel with symbol SO_4	1"
1	Plywood with word "Charged"	2"x4"x¼"
1	Plywood with word "Discharged"	2"x4"x¼"
1	Plywood worded "2.2 Volt Potential"	2"x4"x¼"
1	Plywood worded "Load"	2"x4"x¼"

Electronics Training *from page 12*

electronics are developed and highlighted. We have set forth the characteristics of a circuit-board kit designed to facilitate laboratory instruction, and we have presented a listing of equipment required for the laboratory.

We have considered the needs and problems attendant on specialization in either the communications field or the industrial-electronics field. And, finally, we have presented a proposed two-year curriculum, at the technical-institute level, for the training of industrial-electronics technicians.

We hope that the ideas presented will be helpful. We respectfully suggest that educators, who are not yet familiar with the industry-recommended educational packages, take the opportunity to learn what has been done so that they might be able to evaluate their own programs in light of the recommended standards. ★



"Anybody home?"

Weldments vs. castings

Boat-Trailer Winch

By A. Richard Hegman
Instructor, Mechanical Drafting, Ferris Institute,
Big Rapids, Michigan

WHILE welding is an ideal method of permanently joining parts in fabricating, and an excellent solution to the repair of broken metal objects, it also has an equally important place in manufacturing in the production of basic weldments.

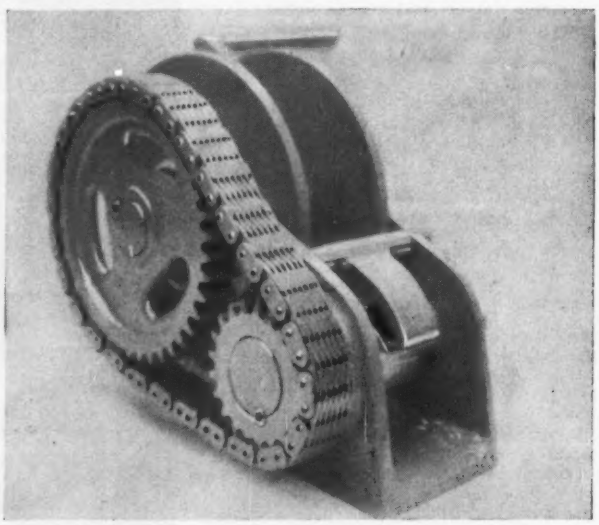
Weldments and castings compete in the same general area. Each are primary products requiring additional machining for completion. As primary products, castings require the expense of patterns, the labor and facilities of a foundry, as well as a moderately high volume of production to amortize pattern costs. Weldments, on the other hand, can be built up from parts cut from individual layouts, by template guided torches, or by mechanized torches. Small lot scheduling is economically feasible because tooling can be held to a minimum when warranted.

Castings in general have superior vibration dampening qualities and can be produced in intricate shapes, whereas weldments excel in strength and shock resistance. Industry evaluates each and chooses the one which provides the needed virtues at the lowest cost.

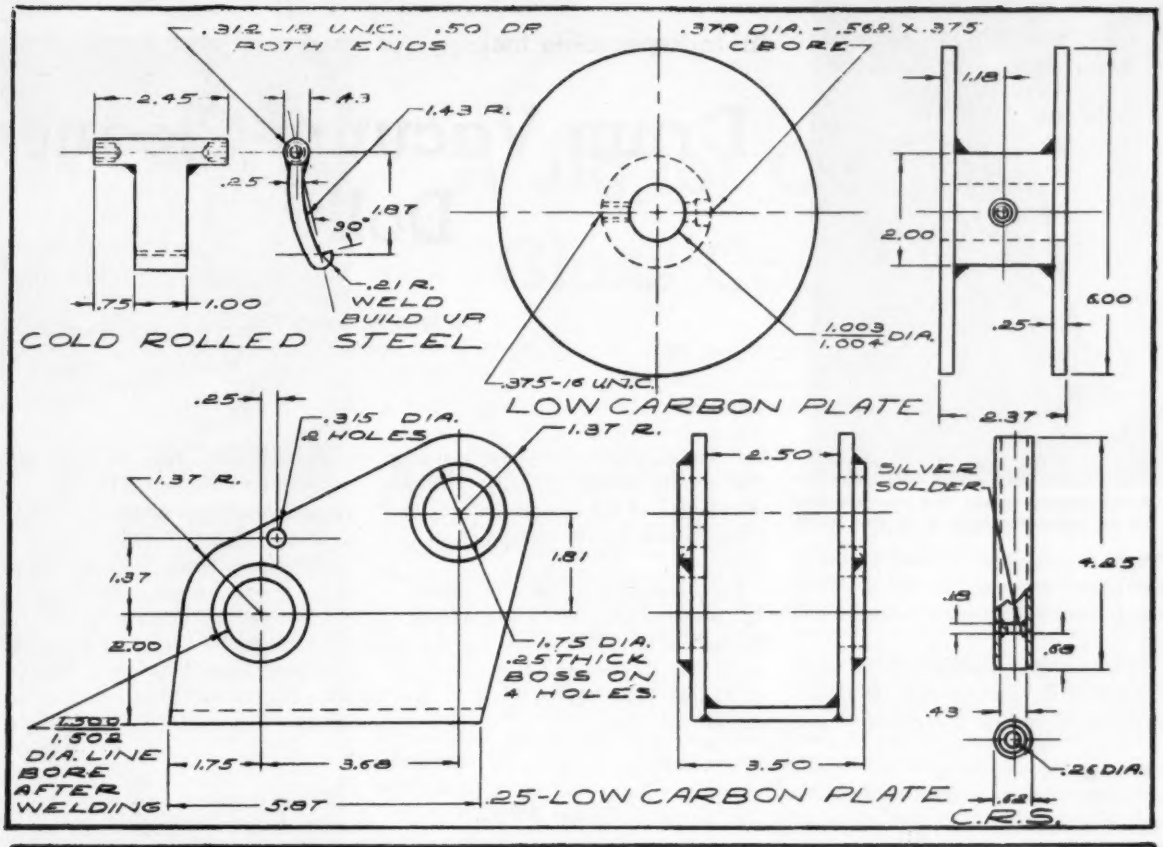
Pictured here is a boat-trailer winch using a typical weldment for the frame. Other weldments include the cable drum, the ratchet pawl, and the handle sleeve.

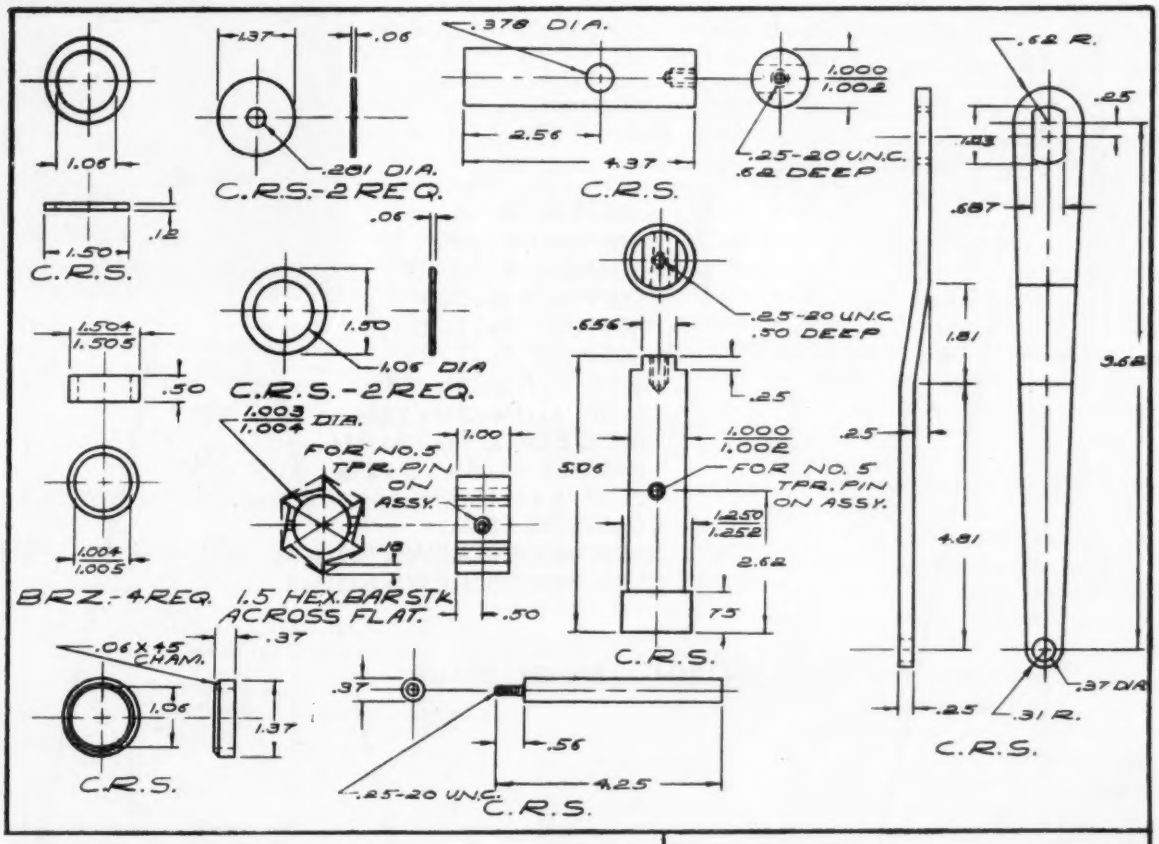
All parts were torch-cut from layout patterns, and the basic frame was completely built up before the bushing holes were line-bored. The drum offers considerable challenge to welding in a confined area while the tip of the ratchet pawl offers experience in surface build-up. The retaining washer in the handle sleeve is secured by a fillet of silver solder.

The winch was designed about a set of used automotive gears and a chain. The gears and chain are available at any auto junk yard, and the only alteration of plans possibly necessary, due to different auto models, would be the gear end of the winch shafts. Chains can be shortened to suit the need. The winch makes an inexpensive welding project of considerable value in both learning experience and utility. ★



The completed boat-trailer winch (right) which is an example of a product using a weldment for a frame.





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ALLOW ±.01 ON TWO PLACE DECIMALS
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A drum vacuum cleaner that you will find to be an indispensable item in your shop.

An indispensable tool

Drum Vacuum-Cleaner Dolly

By John A. Carey
St. Mark's School, Southboro, Massachusetts

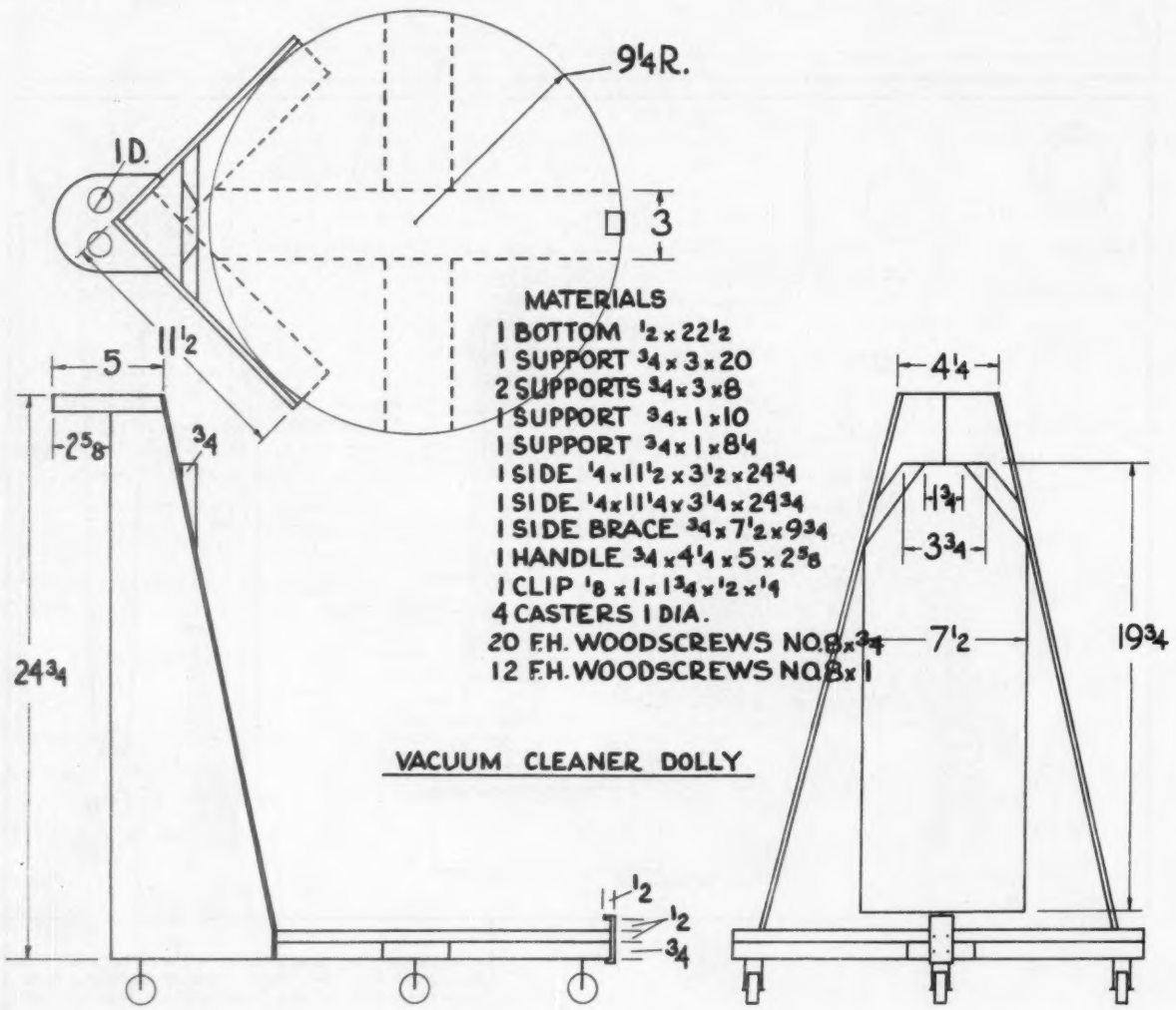
ONCE you have learned to use a drum vacuum cleaner in your shop it becomes another, indispensable tool.

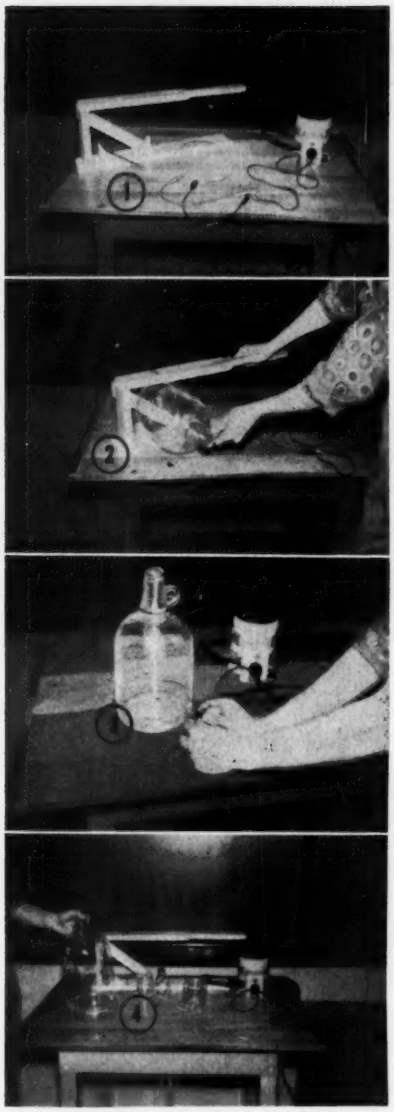
To move the machine about on a commercial three-wheel dolly is an annoying problem, but a pleasure if you have one similar to the one shown here. The upright handle not only facilitates the moving of the cleaner but contains a large recess for the storage of the two tubes.

For the storing of the attachments, a 3/4" plywood ring works wonderfully if the hole in its center is just big enough to fit over the motor. Large dowels are glued into holes drilled some 4" apart around the ring.

An alternate place to store the attachments would be on the side of the upright handle, where spring clips could be used.

The time spent in constructing the dolly is well worth it, because it protects the drum, allows the vacuum cleaner to be wheeled about without it tipping over, and provides a convenient place for the storage of the extra attachments. ★





From top to bottom: Fig. 1 showing the equipment to cut glass containers; Fig. 2, a gallon jug being scribed; Fig. 3, the gallon jug being cut; Fig 4, the job's all done.

Here's a "cutie"

A Jig for Cutting Glass Containers

By Santo Giovinazzo

MacArthur Junior-High School,
Binghamton, New York

A SIMPLE wooden jig can be constructed in the shop from scrap stock and be a useful aid in cutting glass containers for both teacher and student. The purpose of the aid is to score accurate lines around the glass container, be it a soda pop bottle, a gallon jug, etc., prior to cutting.

Insert the glass cutter in the correct hole located on the top of the handle. Be sure the cutter has been properly lubricated. Gasoline or turpentine are both good lubricants.

Place the glass container in the jig. Apply a slight downward pressure on the handle so that the glass cutter is "binding" slightly on the container. Turn the container and score. (Be sure while scoring that pressure is slight on the handle and that the container rests flush to the stop. Otherwise the scoring may be out of alignment.)

After the container has been scored and ready for cutting, be sure all materials needed are readily available. An 8-amp, 117-v, variable-voltage transformer, No. 22 nichrome wire, approximately 5′ of extension cord with a male plug on one end, and alligator clips on the other.

The variable-voltage transformer or powerstat has a female plug in the front, and a toggle switch just above it. The extension cord is plugged into the outlet, the pair of alligator clips are attached, and then the nichrome wire is placed in the clips. It has been found practical to loop or wrap several turns of nichrome wire around the jaws of the clips, leaving about 21″ of wire exposed between the clips to gird a gallon jug. Smaller containers require less wire between the clips.

Before girding the containers, be sure to test the hookup to see if the nichrome wire gets red hot, slightly less than cherry red. (Avoid coming in contact with exposed wire because of the nasty burns that can result. Same holds true to keep fuse from blowing.)

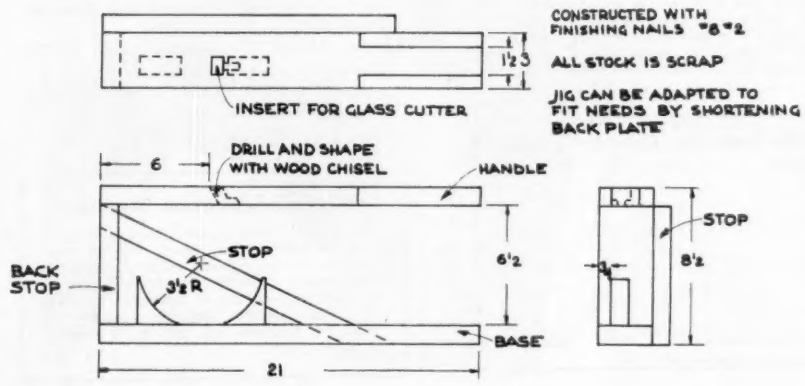
Place the wire around the glass container and set the powerstat. For gallon jugs, with approximately 21″ of exposed wire, the powerstat is set at 17-18 v. The amperage coming through is about 6.2 to 6.5 amps. This will do nicely for all gallon jugs regardless of the varying thickness of the side walls.

Turn on the power and, applying a little pressure to the wire, allow the wire to remain in place until the heat of the wire causes the bottle to crack completely around. If wire does not go completely around container, move the wire so that it comes in contact with the scored surface not yet cracked.

Occasionally, after the glass container has been cracked, the two pieces do not come apart immediately. Use the glass cutter and smartly tap the container near scored area. Sand the edges of the glass with emery cloth or silicon-carbide paper until smooth.

This method, of first scoring then applying heat to the scored area, has proven successful in all attempts to cut various-sized and shaped glass containers, including soda bottles, milk bottles, gallon jugs, odd-shaped glass (see photo), with 95 percent to 100 percent results. ★

JIG FOR CUTTING GLASS CONTAINERS



Guidance . . . . . . *from page 9*

of 40 hours (it is probable the future holds even a shorter work week) has given emphasis to the need for the development of hobbies or avocational pursuits. These activities play a vital role in relieving the tensions of persons who hold strenuous and repetitive jobs so common in industry and business.

The recreational objective of industrial arts takes on greater meaning for the pupil who will enter the professional and managerial echelons of the work world. The psychological need for creative selfexpression with tools, machines, and materials is great among these individuals. The "do-it-yourself" movement along with rather complete basement workshops are manifestations of this need.

Satisfactory job placement is becoming increasingly important as a function of a good pupil-personnel program. The trade-and-industrial-education teacher in a school system generally has the closest contact with industry. In most instances, he considers it his responsibility to spend considerable time in job placement and follow-up of his pupils. The industrial-arts teacher often has contacts with local employers. This relationship can be used to advantage in a pupil-personnel placement program. Pupils might find part-time or full-time employment as a result of their experience with members of the school's industrial-arts department.

A major responsibility of an industrial-arts teacher is to understand and support the many services of the guidance program. In many instances he can serve in a counseling role. Because of his background he can ably assist with disseminating occupational information on an informal basis or through a formal course in "occupations" or "careers." With the proper training he can help in the testing program through homeroom test administration or by administering special aptitude tests as a part of the industrial-arts program. When pupils' problems appear to be of such a character that more professional help is warranted, he should learn to understand and use proper referral techniques.

It is vitally important that the teacher practice the principle of confidence between counselor and client. This respect for confidential information and data is of supreme importance to successful guidance work.

Many industrial-arts teachers bring a wealth of work experience and professional training to the classroom. Add to this background, some training in guidance and personnel work and the industrial-arts teacher can become a vital part of the school's guidance program.

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Industrial-Education Directors:

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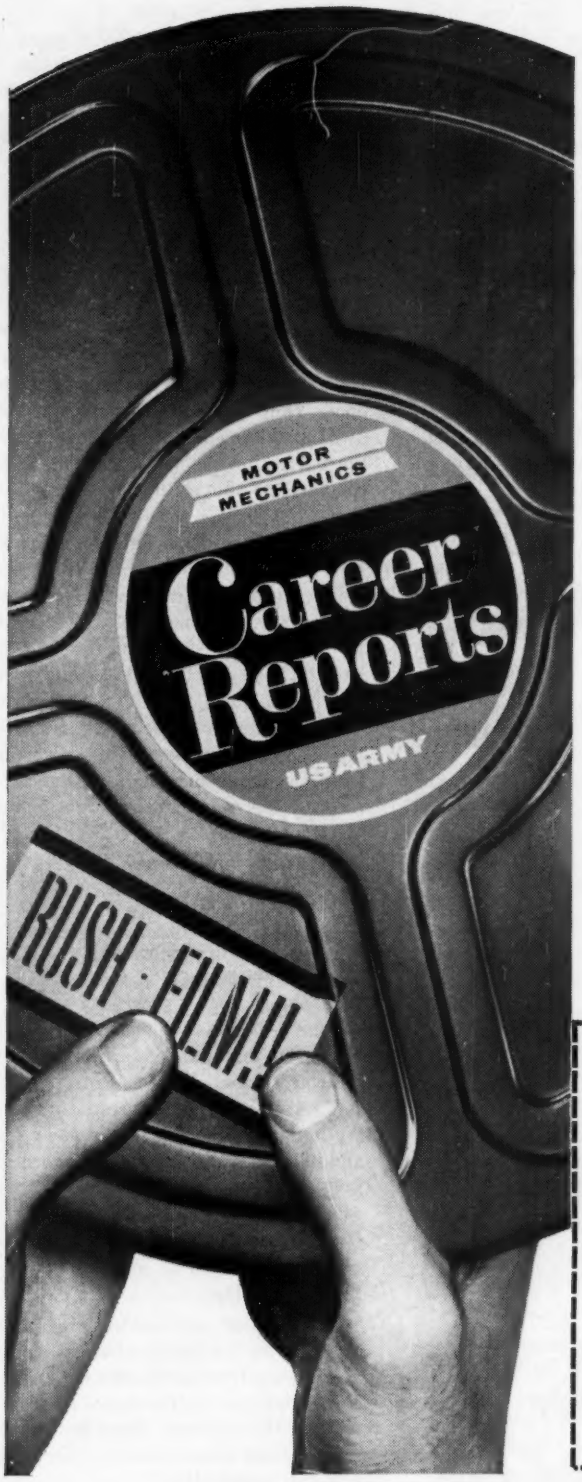
To help you guide the seniors who don't go on to college



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Who sponsors this project? Career Reports is sponsored by the Department of the Army, with cooperation from the American Personnel and Guidance Association, and other recognized vocational authorities.

What is the Army's purpose? Each film in the series conveys a distinct axiom: training is indispensable to success in any skilled occupation. Beginners can acquire this training in one of several ways—on the job (by means of formal or informal apprenticeship), through a trade school or company training program, or in the Armed Services. The Army's purpose is achieved simply by being recognized as one of the possible ways in which a young man can secure essential vocational training.

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book—using proper terminology. I have use, the coiled wires retract to a short

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Measure Your Students with a Tape Recorder

To give my mechanical-drawing program a much-needed "lift," I tried recording a regular weekly test on tape. It was well worth my extra effort. Here is how it worked with a seventh-grade drafting class.

As the students entered the room, I told them to sit quietly and listen for instructions. From that point, the tape recorder conducted the entire test, including correcting and grading of papers!

The recorder instructed the students to write their names, etc., on a blank sheet of paper, cautioned them to listen very carefully to all directions, and informed them that the instructor would ignore any and all questions from the class.

The recorder then asked such test questions on measurement as, "Which is longer, 5/8 or 11/16?" After a short pause, the question was repeated. Then, following another short pause, the recorder asked the next question.

The tape recorder was turned off after the last question. The instructor, without saying a word and ignoring the flood of inquiries, collected the 2H pencils and passed out colored pencils. Then the tape recorder was turned on again.

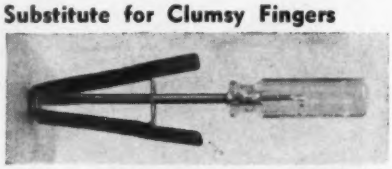
Each student corrected his paper as the recorder supplied the answers in this manner. "Question number one—Which is longer, 5/8 or 11/16? . . . The answer to number one is 11/16. . . . 11/16 is longer than 5/8."

When all questions were corrected, the students were directed by the recorder to figure the percentage and assign the proper letter grade to the test paper.

To my surprise none of the students, not even the very slow individuals, panicked during this mechanical experience. They profited from seeing their own mistakes and immediately hearing the correction. Thus, a learning situation arose from a "normal" test situation.

Too often students only *see* comparisons of distances on drawings and scales. Testing by ear gives a complete new perspective in distance perception. In this testing situation, the students had the scales at their desks and many used them during the test. This procedure involves both the sight and hearing senses and seems to accelerate learning about measuring distances.—*John C. Morrow, Frank Wright School, El Monte, Calif.*

Substitute for Clumsy Fingers



Here is an easy-to-make, screw-holding device that aids in starting screws in awkward places. It is made from .022 x 3/4" spring steel. When pressed together, the handles force the slotted jaws open and the screw is inserted between the jaws. The jaws hold the screw securely when pressure on the handles is eased.—*Harrison Smith, student, New York University.*

Sticky Side Up

Tape a piece of masking tape, sticky side up, on the bench where you're repairing small tools. Small spring screws can be laid out on the tape—in order—without becoming lost or shuffled around out of sequence.—*C. Wayne Close, Glendale, Ore.*

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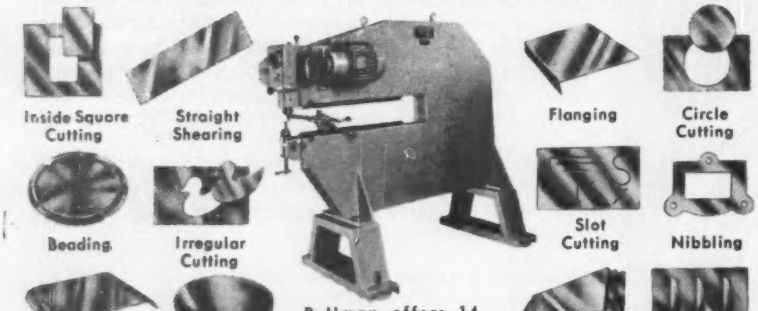

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"De-Ink" Those Hands

If you or your students find your hands smeared with ink after washing a press or cleaning a fountain, try this: Place a little motor oil in the palm of your hand and work it into the dirt, especially around the fingernails. Wipe hands dry with a paper towel. Then wash with soap and water. See how they shine!—*H. V. Filer, San Pedro High School, San Pedro, Calif.*

King-size Bench Hooks

A good method for providing working surface for a large class in linoleum block cutting is to make a large bench hook running the entire length of a work table.

One piece of stock, 8″ or 10″ wide, cut to the length of the table serves as the base. A piece, 2″ x 2″, cut the same length as the base makes a good backing board. Nail and glue the backing board to the base, fasten the assembly to the table with C-clamps, and you have a fast efficient set-up for several students. Allowance of 2′ per student will permit safe and comfortable work conditions.—*Herbert Goldberg, Junior-High School No. 13, New York, N. Y.*

No "Thingamajig" on This Lathe

To aid my students in learning the proper terms for machine-tool parts and operations, I prepared a study guide that required writing a description of how the machine would be set up for various operations. Here are a few of the set-ups I have found to work well in teaching the geography and nomenclature of a lathe:

Set up lathe for longitudinal feed cut, automatically engaged, right-hand cutting, finish smooth cut, and name proper tool holders. Set up lathe for automatic facing operation. Set up lathe for knurling. Set up lathe for threading.

The set-up problems can be made as easy or difficult as the instructor may choose to meet the ability of his students. To add a little spirit, I divide the class into groups of four and have a little "contest" as each group works out the problem by positioning the levers and tools properly. After I have checked the solution, each student writes a description of the set-up in his notebook—using proper terminology. I have found it to be one way of stimulating interest in getting this necessary memory work accomplished.—*Russell Daniels, Capuchina High School, San Bruno, Calif.*

Shock-Absorbing Instrument Leads

I find that replacing the regular test leads on sensitive test instruments with leads made of the coiled wires used on flash cameras provides a longer, less troublesome life for both instruments and leads.

The coils protect the instruments from rough handling when students happen to jerk the leads. When not in use, the coiled wires retract to a short length, so the leads do not become entangled with other tools.

If after a time the coiled leads lose their flexibility, rewind the coils in the opposite direction and the spring effect will be restored.—*Harry J. Miller, Gillespie Junior-High School, Sarasota, Florida.*

Keep Sand Damp

Once foundry sand is tempered properly, a sheet of polyethylene spread over the box will provide overnight protection against drying out.—*William E. Stahl, Jr., Roaring Spring, Va., Junior-High School.* ★

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happenings in industrial education

AVA Convention

TALKS by Abraham A. Ribicoff, Secretary of Health, Education, and Welfare, on Dec. 4 and Sterling M. McMurrin, U.S. Commissioner of Education, on Dec. 5 will feature the 55th annual convention of the American Vocational Association, to be held Dec. 4-8 in Kansas City, Mo. Approximately 3,000 vocational teachers are expected to attend.

The trade and industrial education section of the convention will get under way on Sunday, Dec. 3 with business meetings of the National Association of State Supervisors of Trade and Industrial Education and the National Association of Industrial Teacher Educators. The first general session of the section will be held on Tuesday to discuss "Goals and Trends in Industrial Education." This will be followed by a session on "Our Role in Achieving Goals," to be held on Thursday, with John P. Walsh of the U.S. Office of Education as the speaker. A third general session on Friday will feature a symposium on "Implementation of Industrial Manpower Trends and Goals."

The T&I section will also hold joint meetings on Tuesday with the American Technical Education Association and the National Council of Local Administrators. Meetings will also be held during the convention in the following areas of instruction: electronics and instrumentation, automotive, construction trades, supervisory training, apprenticeship, new technical areas, graphic arts, and cooperative programs.

The industrial-arts section of the convention will include meetings on "The Development of Marketable Skills in Industrial-Arts Programs," "Industrial Arts and Other Areas of the School Curriculum," "Industrial Education in Special Education," and "Enlarging Developments in Industrial Arts." The last topic will include discussion of instructional units, teaching machines, the Peace Corps, and reorganization in the junior-high school.

A feature of the industrial-arts section meetings will be a debate on Thursday on the question "Resolved: That industrial arts, trade and industrial, and technical offerings be organized as a single department in a comprehensive high school." E. H. Curry, J. Lyman Goldsmith, and E. L. Kurth will be debaters, and G. Harold Silvius will be chairman.

A special program for general school administrators to be held on Wednesday will include a panel discussion on "Implications of Vocational Education in the Age of the Astronaut." Members of the panel will be Ed. C. Ralston, R. W. Baker, David W. Berryman, Raymond J. Sacks, and Paul Custer. Howard M. Terry will be discussion chairman.

Other meetings during the convention will include those on international education, research, and safety education.

Associated organizations will also be meeting during the AVA convention. These include the National Association of State Directors of Vocational Education, which will start its session on Friday, Dec. 1; the American Technical Education Association, which will hold its first meeting on Sunday, Dec. 3, and will include sessions on "A Look Ahead in Technical Education," and "Plans for Expanding Technical Education"; the National Council of Local Administrators of Vocational Education and Practical Arts; and the Conference of Officers of Affiliated State and Territorial Associations.

Printing Conference

PLANS to develop a national standardized series of achievement tests for seniors in vocational-printing courses and to issue special-achievement certificates were made by members of the

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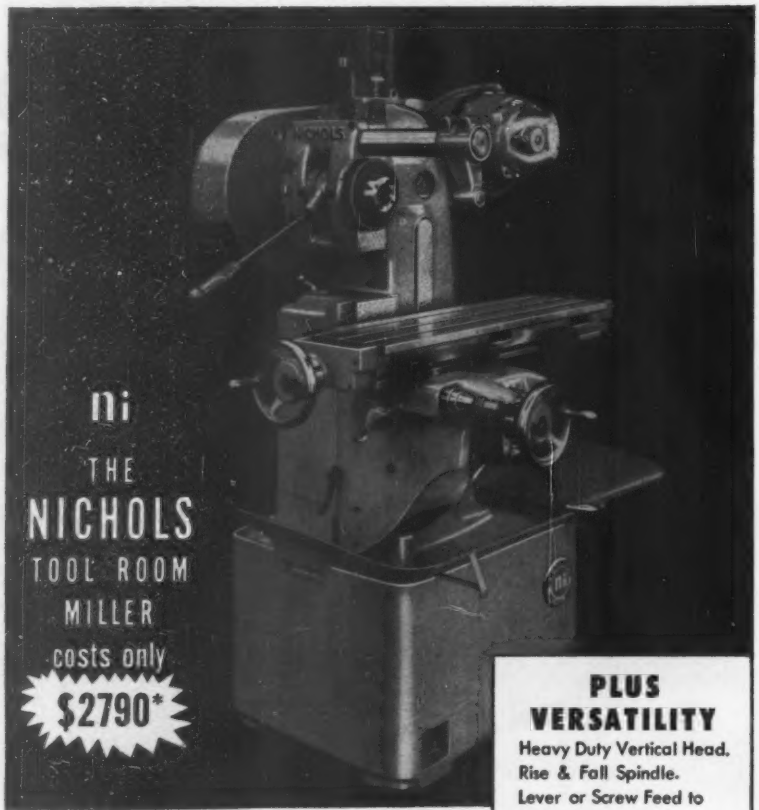

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International Graphic Arts Education Association at the 36th annual conference on printing education held at Ferris Institute, Big Rapids, Mich., in August.

This project was one of six approved by the convention. Other plans include: using aptitude tests to select students for vocational- and technical-printing courses; publishing new suggested outlines for courses of study in graphic-arts education, including photography, chemistry, physics, electronics, and mathematics; expanding Printing Education Week programs in the schools; publishing a directory of more than 3,000 graphic-arts and printing teachers; and publishing a history of the graphic-arts education movement.

Speakers at the conference included Maurice W. Roney of the U.S. Office of Education; Samuel M. Burt, managing director, Education Council of the Graphic Arts Industry; Norman P. Mitby, director, Madison Vocational and Adult School, Wis.; Lawrence Voss of Ferris Institute; Richard J. Epp, of Riverside City Schools, Calif.; Kenneth G. Scheid, head of the department of graphic arts, Carnegie Institute of Technology; Kenneth L. Ross, specialist in printing for the International Cooperation Administration; and Harry E. Brikman, president of the Education Council of the Graphic Arts Industry.

Mr. Epp was elected president of the Association for the coming year. Vice-presidents elected were: Harold E. Sanger, Marshall High School, Chicago; Ora E. Smith, Central High School, Cincinnati; and Walter Schoff, New York School of Printing, New York City. Anthony Karpowitz, Milwaukee Vocational and Adult School, Wis., was named secretary; and Donald L. Hays, Anderson High School, Ind., was elected treasurer.

The 1962 conference will be held at Western Washington College of Education, Bellingham.

Nevada IE Teachers Organize

VERNON MOHR, machine shop instructor at Las Vegas High School, has been named temporary president of the new Nevada Industrial Education Association, which was organized during the annual conference of the Nevada Vocational Teachers Association held at the University of Nevada in August.

Other temporary officers named were: James Blinn, Elko County High School, vice-president; and Clarence McCarrell, White Pine County High School, Ely, secretary-treasurer.

The charter members of the organization have requested the Nevada State Supervisor of Trade and Industrial Education to draft a tentative constitution.

New I-A Building

CONSTRUCTION is now under way on a new $950,000 industry and arts building at St. Cloud, Minn., State College.

The new building, which will provide approximately 34,500 square feet of floor space, will house a woodworking shop; graphic-arts room; electricity, electronics, and power shop; ham-radio facilities; two metal shops; and a handicrafts laboratory and crafts room, in addition to art rooms, display areas, storage rooms, offices, and a 200-seat lecture hall.

Ball State Conference

"NEW Dimensions in Industrial Arts" will be the theme of the ninth annual Ball State Industrial Arts Conference, to be held November 18 at Ball State Teachers College, Muncie, Ind.

Keynote speaker for the conference will be M. Ray Karnes, professor of higher education, University of Illinois. The conference will emphasize new ideas and new methods of instruction for the years ahead.

Welding Competition Winners

A STUDENT from Northwestern High School, Lake Nebagamon, Wis., and three students from Shamokin Area

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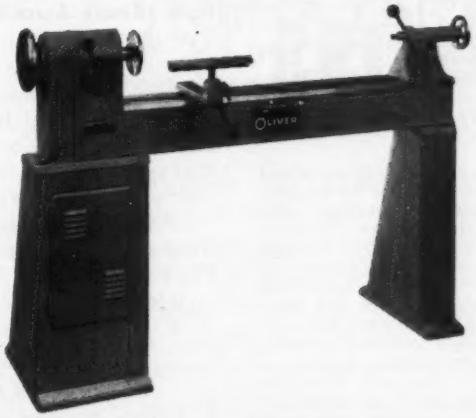

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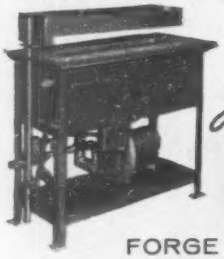

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Joint High School, Pa., have been named first-place winners in the industrial-arts division and the vocational trade and industry division of the 1960-61 national arc welding competition sponsored by the James F. Lincoln Foundation of Cleveland, Ohio.

The industrial-arts winner was John M. Johnson of Lake Nebagamon, Wis., whose winning entry was a crawler trailer. John R. Korbich of Paxinos, Pa., and Ken Midway and Harry Wehr, both of Shamokin, Pa., were the first-award winners in the vocational trade and industry division with a World War II Veterans Memorial.

The winning projects were designed and built by the students under the guidance of their shop instructors. Awards were based on the usefulness of the projects, the ability and ingenuity shown in their design and construction, and the clarity and completeness with which the projects were described and illustrated. A total of 249 cash prizes were given in the competition.

This was the first year that the Foundation had broadened the competition to include industrial-education students.

New Illinois Association

THE Illinois Association of Electricity-Electronics Educators, a new organization which was formed last spring at Arlington Heights, Ill., held its first meeting of the fall term on Oct. 14 in the Lyons Township High School, Western Springs, to adopt its constitution.

John W. Griffith is president of the new association. Other officers are: Floyd Corl and John A. Striepling, vice-presidents; Dave Baker, secretary; and T. W. Whitfield, treasurer. ★

CONVENTION CALENDAR

Virginia Industrial Arts Association, Richmond, Nov. 3-4.
Kentucky Industrial Education Association, Kentucky Hotel, Louisville, Nov. 3-4.
Oregon Industrial Arts Association, Medford Senior-High School, Nov. 10-11.
Fall Industrial Arts Conference, Trenton State College, N.J., Nov. 17-18.
California Industrial Education Association, Southern Section, Fullerton Junior College, Nov. 17-18.
American Vocational Association, Kansas City, Mo., Dec. 3-8.
Illinois Vocational Association, Hotel Pere Marquette, Peoria, Mar. 1-3.
California Industrial Education Association, San Diego, Mar. 9-10.
Michigan Industrial Education Society, Civic Auditorium, Grand Rapids, April 12-14.
American Industrial Arts Assocation, Pittsburgh Hilton Hotel, Pittsburgh, Pa., April 16-19.

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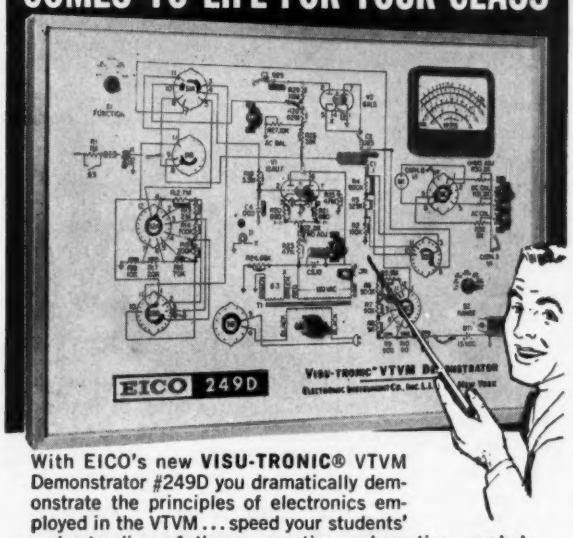

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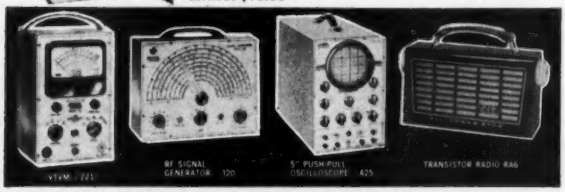

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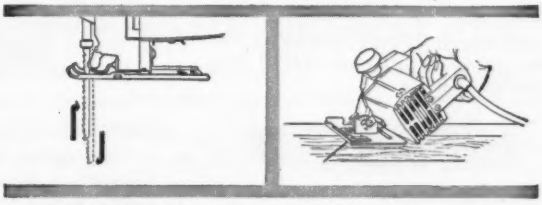

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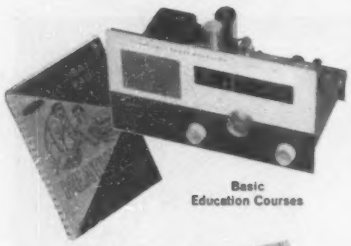

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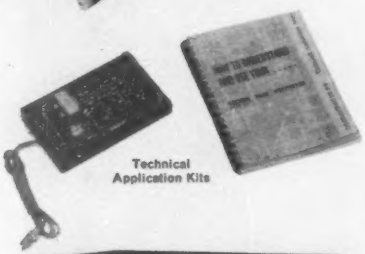

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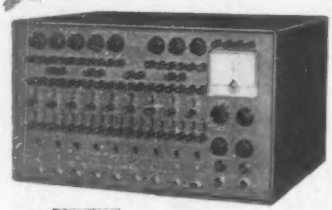

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News ABOUT TRAINING

The Technician

From the U.S.O.E., Area Vocational Education Branch

WE quote the first item of a recent newsletter:

"*Technical Education Loses a Champion*: The passing of Miss Jeanne Miller, editor of *Technical Education News*, represents a tragic personal loss to her many friends in technical education. Miss Miller, through her astute editorial policy and writing ability, contributed in many ways to the support and understanding of technical education."

Other items emanating from the U.S.O.E. follow:

Here is a list of recommended general bulletins that should be useful in operating technical education programs:

The Instrumentation Technician, Grantham School of Electronics, 1505 N. Western Ave., Hollywood 27, Calif. 35c.

High School Dropouts, National Education Association, 1201 Sixteenth St., NW, Washington 6, D.C., revised September, 1959. 25c.

New Teaching Aids for the American Classroom, Institute for Communication Research, Stanford University, Palo Alto, Calif.

Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1959-60 *and* 1960-61, Research Division, National Education Association, 1201 Sixteenth St., NW, Washington 6, D.C., 1961. Single copies free while available.

Bibliography of Research in Trade and Industrial Education, OE-84011, U.S. Department of Health, Education, and Welfare, Office of Education, Division of Vocational Education, Washington 25, D.C., 1960. Free.

The following can be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.:

Offerings and Enrollments in Science and Mathematics in Public High Schools, OE-29021, Kenneth E. Brown and Ellsworth S. Obourn, 1961. 35c.

Research Problems in Mathematics Education, OE-12008, 1960. 55c.

Science as a Way of Life, OE-29023, Ellsworth S. Obourn, 1961. 15c.

The 2-year Community College, Bulletin 1958, No. 14, D. G. Morrison and S. V. Martorana, 1958. 20c.

Publications in the Office of Education in 1961, OE-11000A. 25c.

Careers in Science, Mathematics, and Engineering, OE-26007, A. Neal Shedd, 1961, 25c.

Progress of Public Education in the United States of America, 1960-61, OE-100050-61-A. $1.25.

The National Defense Counseling and Guidance Training Institutes Program, A Report of the First 50 Institutes, OE-25011, Leona E. Tyler, 1960. 35c.

Health, Education, and Welfare Trends, 1961 Edition. $1.00.

Report on the National Defense Education Act, Fiscal Year Ending June 30, 1960, OE-10004-60. 55c.

Organized Occupational Curriculums in Higher Education, OE-54012, Ken A. Brunner and D. Grant Morrison, 1961. $1.50.

Facilities and Equipment for Science and Mathematics, OE-21000, W. Edgar Martin, 1960. $1.00.

Employment of Scientific and Technical Personnel in State Government Agencies, prepared by U.S. Department of Labor, 1959. 45c.

Teaching Machines, OE-34010, Lawrence M. Stolurow. 65c.

The Third Annual Conference on Technical Education held in Miami, Fla., attracted more than 125 technical educators. Walter Arnold, former director of the Area Vocational Education Branch and now acting assistant commissioner for vocational education, appeared in a television interview with Thurman Bailey of the Florida State Department of Education.

Cooperation in Michigan

GREATER cooperation between the University of Michigan and the state's technical schools, institutes, and community colleges is expected to result with the appointment of Norman C. Harris to a new post at the University in Ann Arbor.

Harris, former dean of vocational-technical education at Bakersfield College, California, has accepted an appointment as associate professor of technical education at Michigan. With wide experience in working with local business and industry committees surveying occupational needs and developing curriculums to meet these needs, Harris will serve as teacher and consultant to those in training at the University as well as teachers and administrators in the field.

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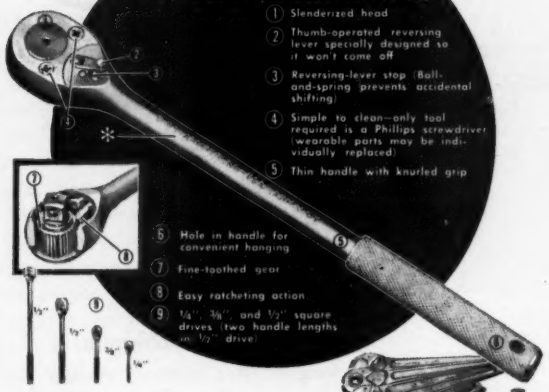
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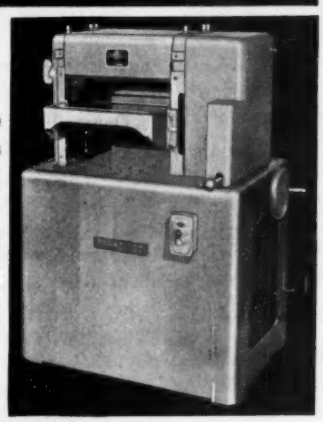

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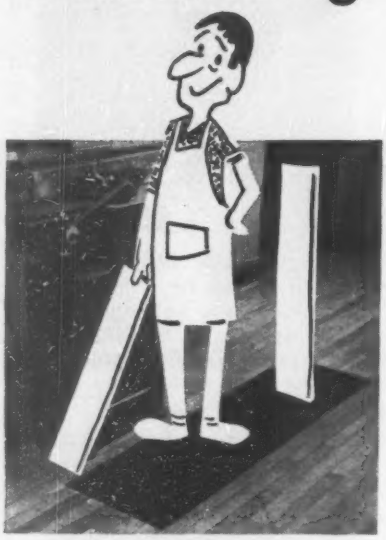

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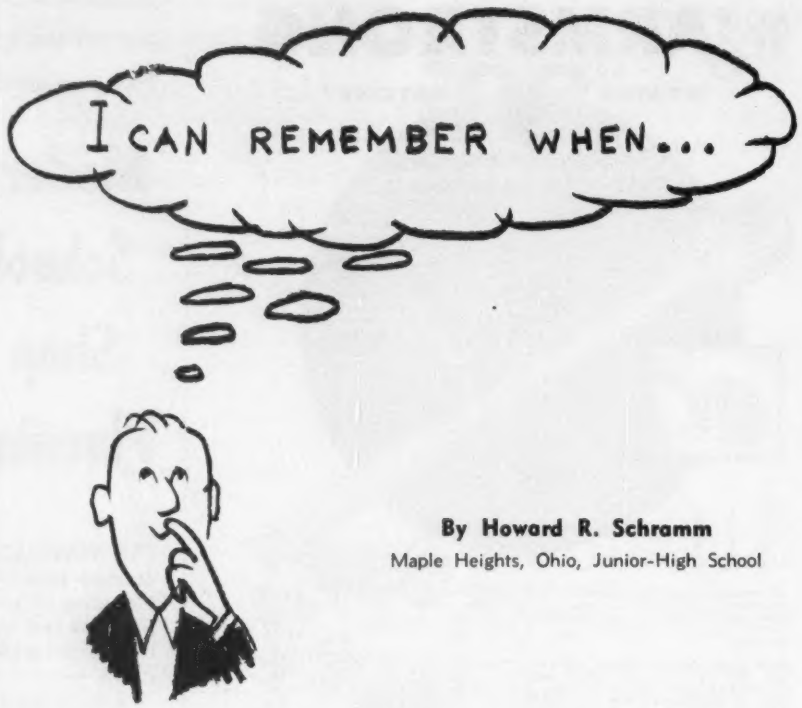


I CAN REMEMBER WHEN...

By Howard R. Schramm
Maple Heights, Ohio, Junior-High School

I CAN remember—

. . . How as a seventh grader *x* number of years ago, I would eagerly look forward to my period in the wood shop.

. . . How we would hustle to the shop that had "Manual Training" lettered on its door.

. . . The poorly lighted and equipped wood shop in the damp basement of the school.

. . . My first project — one of a pair of bookends, all of which were alike except mine which were painted Chinese red.

. . . The problems encountered in trying to square the stock for the bookends.

. . . How thrilled I was when I presented the bookends to my Mother. She's still using them — as shelf braces in a closet.

. . . My good friend and shop teacher — he's still one of my favorites.

. . . When, under watchful eye, how excited I was when my teacher let me use the big band saw — I had to stand on a stool.

. . . What a struggle I had pulling the electric belt sander back when sanding the pine boards for my bookcase — nearly lost it several times.

. . . How proud and happy I was when my bookcase was on display at the spring Open House — that bookcase is still in use and not in the basement.

Yes, limited as it was, I can vividly remember my seventh-grade shop experience because it was happy, thrilling, and rewarding.

Today, I am an industrial-arts teacher and proud of it. Seventh-graders still hustle eagerly to their industrial-arts classes with the same zeal and enthusiasm that I had *x* number of years ago.

Fortunately, in most communities, industrial arts has progressed and is being taught in modern, carefully planned, well-lighted, and well-equipped shops. It is a more comprehensive program, reflecting our complex industry and technology. It is taught by better trained and more creative industrial-arts teachers. Yes, in many places, industrial arts has achieved its rightful place in general education.

Yes, we have gone forward, but there are still far too many places where woodworking is industrial arts; where shops are still poorly lighted, poorly planned, and poorly equipped; where every student still makes the same project; and where creativity does not prevail. ★

Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

Whose Approach Shall We Use?

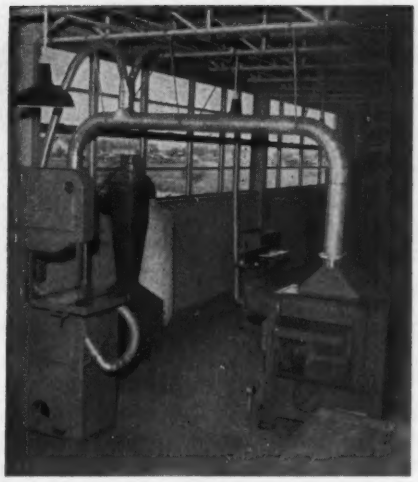
THERE are occasions when the seeds sown by Diamond Dust fall on barren ground. It is always pleasing, therefore, when we find evidence that a few seeds have germinated and induced some alert teacher to take issue with what has been said.

One of these occasions appeared when a bright young fellow informed this author that when we objected to the idea of having pupils memorize the various parts of a piece of equipment we were in error. While we have no desire to modify what we said, we are flattered to find someone who stirs the Dust a bit and discovers that there is an idea concealed in it that concerns one which he has an opinion about, too.

The fact that his opinion is at variance with that of the author is not important. The real value of a situation of this kind appears when we find the reader has reflected on what is said and is stimulated to tell the author that he is all wet. When this occurs the author might be tempted to defend his point of view, but it has been our experience that this frequently leads to recrimination and tends to nullify our efforts to make friends and influence people.

In view of this, we are disposed to grant that the objections raised by the reader may be sound, but we reserve the right to assume that we may be right, too. It is fundamentally true that conclusions reached by anyone are governed to a large extent by his point of view. If he observes a road sign as he approaches it, he may be quite positive that it is black. On the other hand, his friend, who is driving, and who sees the same sign reflected in his rear mirror, is apt to be just as positive that the sign is white. If each of these individuals took the trouble to examine the sign from the same point of view they might be surprised to find that they were both right. One side was black and the opposite side was white.

If this be true, and we believe it is, would it not be good policy, when a difference of opinion rises, to assure ourselves that both parties are examining the question at issue from the same standpoint. This might lead to



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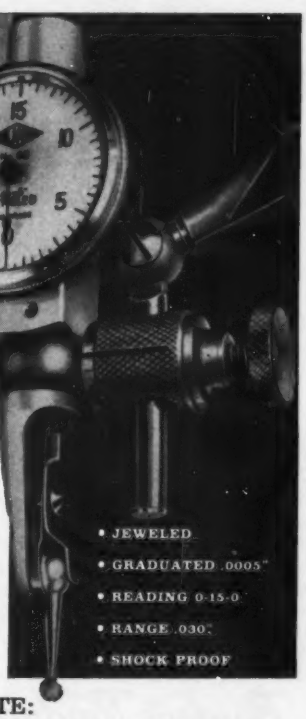

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mutual understanding, and it would tend to eliminate bitter feelings that are frequently engendered as a result of any argument that may ensue.

When one considers the principle involved here, he might think of the possibility of its having some application to teaching industrial arts. When a teacher is presenting a lesson to his pupils, it is quite important that he make clear to the class the point of view from which he is approaching the topic. Is he assuming that the pupils have had some experience in the subject, or is he starting from zero? Must the pupils learn the rudiments? When he is discussing a project or a drawing, is he looking at it from the top, the bottom, the front, or the side? And which side? When he speaks about the right side of an object does he keep in mind that the pupils are facing him, and that to them, his right side is their left?

In short, if the point of view of the teacher is not clear to the pupils, one cannot blame them if they misinterpret what the teacher says or does. What a person sees when he looks at an object or an idea depends on the point from which his observation is made. ★

*strictly personal

Samuel Hitchcock, Wyoming State Director of Vocational Education, retired last July after 39 years in vocational education.

Theodore J. Cote is serving as program specialist, North Atlantic Region, for the Trade and Industrial Education Branch, U. S. Office of Education. Before his recent appointment, he was assistant director, Kaynor Technical School, Waterbury, Conn.

Harold B Black, formerly assistant director, is now director, Division of Vocational and Industrial Arts Education, Pittsburgh, Pa., Public Schools. He succeeds **Charles F. Hoffmaster**, who is retiring.

David A. Rigsby has been appointed to the industrial-arts faculty of Appalachian State Teachers College, Boone, N. C. He formerly was with the Laboratory School, Woman's College of North Carolina, Greensboro.

Henry R. Ziel has been appointed assistant professor of industrial education at the University of Illinois. He was formerly associated with a number of industrial organizations, the New York State Department of Education, and he has taught school in New York State. He joined the staff at Illinois this fall.

Clarence E. Gerrish, formerly of Derby, Conn., High School, is now assistant professor of industrial arts, Rhode Island College, Providence. ★

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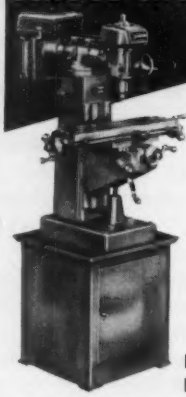

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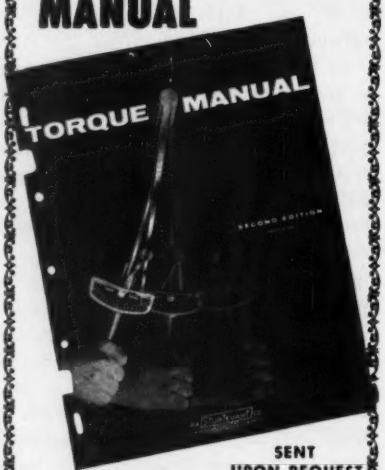

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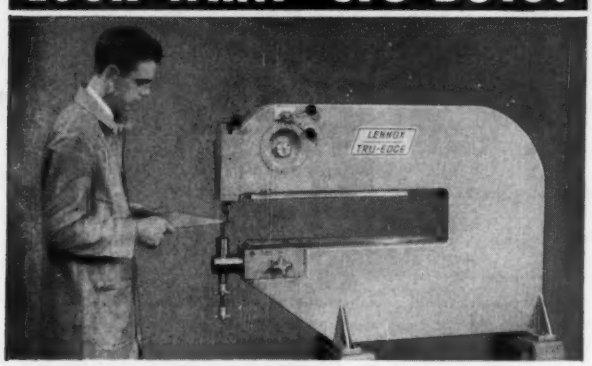

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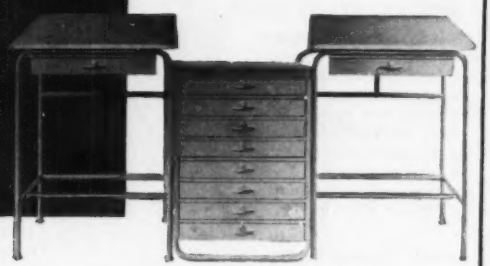

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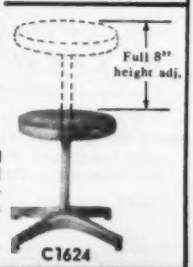

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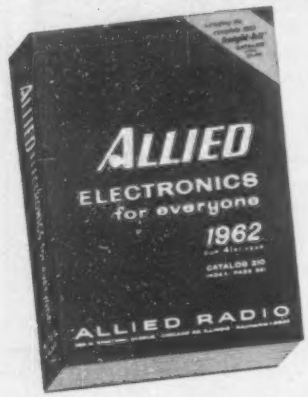

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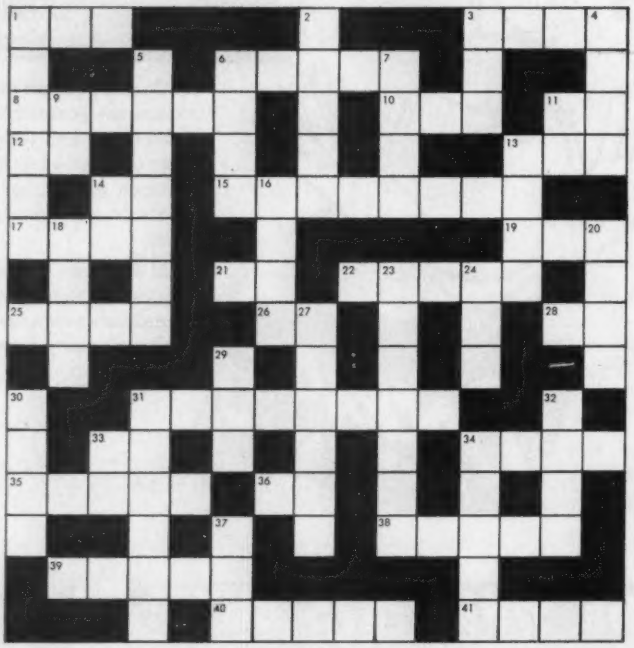
By William C. Curr
New York, New York, School of Printing



ACROSS:

1. Opposite side guide of near.
3. If feeder misses a sheet the press should .....
6. Gravure is known for its fine reproduction of .....
8. When on impression the cylinder must ride on the .....
10. Electric ..... control.
11. Type of electric current.
12. Square of type body.
13. An excess of ..... will cause setoff.
14. Printing Pressmen (abbr.).
15. Highest skilled craftsman in the graphic arts.
17. Will cause a slur.
19. A wheel containing a high and low spot.
21. Pressman's parent.
22. Requires careful setting to eliminate a wrinkle.
25. Solids should be ..... type high.
26. 1,000,000 impressions.
28. Printing unit of measure (abbr.).
31. Newsprint is made from .....
33. Reducing varnish.
34. Right side of paper.
35. For folding against the grain it is sometimes necessary to ..... a job.
36. Pressman's other parent.
38. A means of preventing setoff.
39. Result of over packing.
40. Strong brown paper.
41. Halftones are composed of various sized .....

DOWN:

1. Product of wood and rags for paper making.
2. Used to cut tissue.
3. To bundle.
4. Term used when coating pulls off a sheet.
5. Holds a sheet to packing.
6. When overprinting, second down ink must ..... on the first down.
7. An ink ..... before it dries.
9. Type measure.
11. Indefinite article.
13. Moving a press slowly.
14. Jumbled type.
16. 500 sheets of a standard size.
18. A form that has not yet been printed.
20. What stereotypes are cast from.
23. Used to distribute ink.
24. Sized and super-calendered.
27. World's largest international printing trade union (abbr.)
29. Another name for a platen press.
30. An interlay is put between the plate and
31. Results of a bowed form.
32. Used for coating paper.
33. Reducing varnish.
34. Reward for spoiling job.
37. When it is doubtful it is advisable to .....

(The solution to this puzzle, which appears in SCHOOL SHOP through the courtesy of the American Pressman, appears on page 47 of this issue.)

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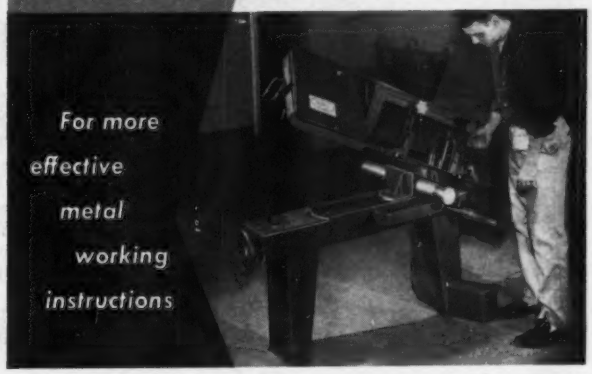

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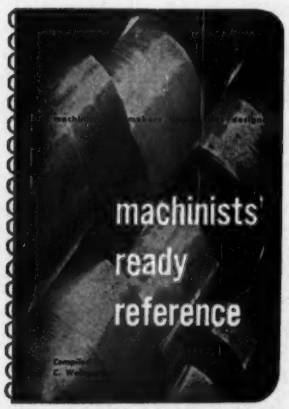

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Books:

Craft and Contemporary Culture. Robertson. London: George G. Harrap & Co. Ltd., 1961. Pp. 158. $3.50.

This book, commissioned by Unesco, resulted from a decision made at a seminar on Art and Crafts in General Education and Community Life organized by Unesco at Tokyo in 1954. The aim: to treat the esthetic, psychological, sociological aspects of crafts, their practice as an expression of cultural values for the individual in contemporary society, the industrial designer, and many other aspects.

The aim is achieved, and a satisfying reading experience results as the book defines craftsmanship and examines the dilemma of craftsmanship today, craft education with children and adolescents, the training of craft teachers, and many other items, including the problems involved in the presentation of traditional crafts in the modern world.

A message in Japanese handwriting appears on page 49. It was sent half-way around the world to greet this book, and it reads, "When one craftsman meets another as I, Mio-Mio, met you, Seona (the author's first name abbreviated), there is no barrier of race or language."

The author, Senoaid Mairi Robertson, was a senior research fellow at the Institute of Education at the University of Leeds, England, at the time when she was commissioned by Unesco to write this book.

The Instructor and His Job. Rose. Chicago: American Technical Society, 1961. Pp. 280. $5.50.

This book contains practical examples of basic teaching principles as applied in schools, industry, government, and the military services. Fundamentals are stressed in an attempt to bridge the theoretical aspects of psychology and education with practical, everyday problems in the classroom. There are questions and suggested assignments at the end of each chapter.

The author, Homer C. Rose, is chief, Management Training and Training Development Branch, Federal Aviation Agency. He covers thoroughly the demonstration, training aids, lesson plans, testing, etc., in a direct, easy-to-read approach that encourages reading.

Introduction to Electronics. Hughes and Pipe. New York: Doubleday & Company, Inc., 1961. Pp. viii + 421. $3.95.

Named a "Tutor Text," this is not an ordinary text. The pages are numbered in the usual manner, but they are not read consecutively. The text acts as an individual tutor, presenting information and examples, asking questions, and directing the reader to the page in the book that is indicated by the reader's answer.

If the reader is wrong in responding to a question, he is directed to material that will set him straight. If right, he is so informed; new material is presented and progress continues.

The book presents the principles of electronics in terms of radio communications. The text is in a conversational style and should aid in stimulating interest in the student encountering this subject matter for the first time.

Robert J. Hughes, is editorial director of *Western Design* prior to which he was a writer and editor on the staffs of the Chicago *American* and the Chicago *Sun Times*. Peter Pipe, a native of England, is a veteran pilot and radar instructor of the Royal Air Force and has also been a writer and editor for the San Francisco *News-Call Bulletin*.

The Automobile Engine. Weinstein. Philadelphia: Chilton Co., 1961. Pp. xxv + 623. $7.95.

This book presents essentials of the modern automobile engine, in both theory and practice. Specifically, it was written for use in vocational-technical schools. It includes primary information about the purpose and function of all components of the modern auto engine and describes in detail the most popular service operations as an exploratory activity for training on the job, in school, or at home.

Subject matter is presented in simple language and logical order. Theory and presentation of fundamentals are followed by job application.

The introductory chapter presents a brief history of the automobile, mainly American, but with some reports on auto manufacturing in Europe. One complete chapter is concerned with fuel-injection systems.

The author, William Weinstein, is an instructor of auto mechanics at Woodrow Wilson Vocational High School, New York City.

ABC's of Ham Radio. Pyle. Indianapolis: Howard W. Sams & Co., Inc., 1961. Pp. 112. $1.50.

This paper-bound book introduces the reader to the ham-radio hobby. It aims to give understanding to the basic principles of electricity and their application to radio.

Much of the content is concerned with describing the requirements for obtaining a novice license and instructing in material needed to pass licensing examinations.

The author, Howard S. Pyle, W70E, is a former radio inspector and license examiner.

Reading and Detailing Assembly Drawings: Dies. Vezzani and Salmonson. Detroit: Royalle Publishing Co., Inc., 1961. Pp. vii + 83. $3.60.

This text provides experiences in reading and detailing assembly drawings and acquaints the student with the use, principles of operation, and construction of dies for fabricating parts from sheetmetal.

The dies the student will encounter represent

a cross section of the die construction trade and, though specialized, provide a medium to teach basic principles of detailing and develop an ability to read assembly drawings. The drawings in the text represent what is actually found in the trade.

As a teaching aid, tests are presented at the end of each section and coded answer keys are available to make test correction a quick, easy chore.

Engineering Drawing and Geometry. (Second Edition.) Hoelscher and Springer. New York: John Wiley and Sons, Inc., 1961. $8.95.

The objective for this text is to cover adequately the work in basic drawing courses, fundamental descriptive geometry, advanced work for the professional fields, and fundamental work in graphical computation.

This is a large book. The pages are oversize, and there are 30 chapters grouped into four sections: Basic Drawing, Geometry of Advanced Projection Systems, Technical Charts and Graphic Computation, and Professional Applications. The many illustrations are of excellent quality.

Aids to Machine-Shop Practice. Bower. New York: The Macmillan Co., 1961. Pp. 192. $4.50.

Here is a book devoted to tricks of the trade. It contains practical, up-to-date ideas to help the production engineer, machine operator, toolmaker, and others with an interest in the engineering machine shop.

The ideas were originally published as a series in *Machine Shop Magazine* and are assembled in book form by grouping into sections to provide rapid reference. Some of the sections are: drilling and tapping, gaging, grinding; lathework, marking-out, welding, etc.

Liberal use of illustrations is practiced throughout, and an index is provided at the back of the book.

C. T. Bower is a well-known writer in production engineering, and he has had wide experience both in Great Britain and the United States.

Home Mechanics (Revised Edition.) Schaefer and Smith. Milwaukee: Bruce Publishing Co., 1961. Pp. xi + 148. $2.22.

This is a basic text intended for use at the junior-high or senior-high level. It introduces some of the common, recurring repair jobs for household appliances and fixtures. The book is suitable for boys, girls, and evening-school students.

A few of the chapter headings are: Steel Pipe and Fittings, Storm Windows and Screens, and Paints and Painting. A chapter on the home workshop includes planning the shop area, care of tools, and handling of various materials.

Carl J. Schaefer is associate professor of industrial education at The Pennsylvania State University, University Park. Robert E. Smith, consulting editor of this book, is professor emeritus in the area of industrial arts and vocational education at The Ohio State University, Columbus.

10c Crafts for Kids. Wardwell. New York: Association Press, 1961. Pp. ix + 128. $2.95.

This is a book that evolved from the author's experience working as an adult leader with boys and girls, age six to twelve, in

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The Story of Hardboard is a 15-page booklet describing briefly, and in a nontechnical manner, the process of manufacture, the industry's contribution to conservation, and the broad line of products and uses. The booklet and similar publications, *Story of Lumber* and *Story of Pulp and Paper*, are available at no charge from the American Hardboard Association, 205 W. Wacker Drive, Chicago 6, Ill.

Most-Often-Needed Television and Radio Servicing Information—Master Index to Supreme Publications is to simplify the task of locating needed material.

This 1961 edition gives direct reference to volume and page number to Radio Volumes 1-21, and TV Manuals TV-5 through TV-18.

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Hobby and Craft Films is a series of 10 movies covering most phases of constructive craft activity. The films are 16-mm with sound, in color and in black and white. Running time ranges from four to 20 minutes. Most of the films are concerned with model making. Some of the titles are *Model Building Builds Model Boys, Wings for Tomorrow,* and *Highway Pioneers.* All are available on a free-loan basis. Address requests for information to Hobby Industry Association of America, Inc., Film Library, 1528 Walnut St., Philadelphia 2, Pa.

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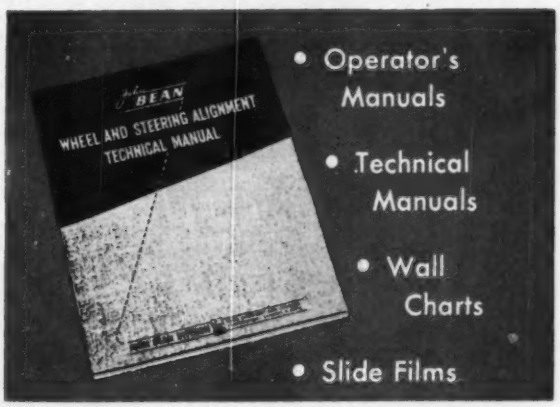

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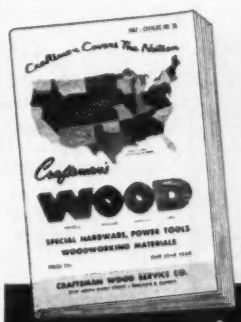

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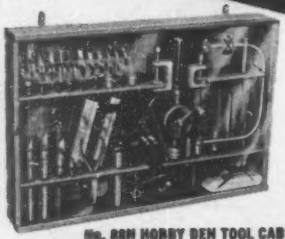

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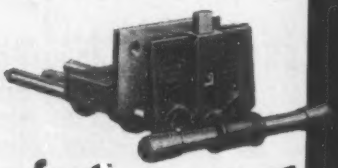

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news from Industry

(Circle the numbers on the card in this issue to secure the items listed.)

"Uncle Harry" Masters Retires

Harry E. Masters, education director of L. S. Starrett Company and a veteran of 32 years' attendance at state and national vocational and industrial-education conventions, has retired. His successor is R. Leonard Deane.

Mr. Masters

Mr. Deane

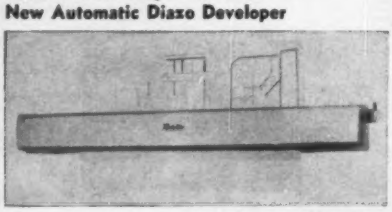
"Uncle Harry," as he was affectionately known to many of his younger colleagues, served the Starrett Company for 60 years. A pioneer in vocational and industrial education, he attended his first American Vocational Association convention in 1929 in New Orleans at which time he also joined The Ship's Crew.

In 1956, Mr. Masters received an AVA Citation Award for 25 years of Outstanding Contribution to the Ship and Vocational and Industrial-Arts Education. He has also served the Ship as Radio Officer, Log Officer, Second Mate, and in 1959 was elected Captain.

Mr. Masters will be at home at 61 Prospect Street, Athol, Mass.

Mr. Deane was assistant personnel director of L. S. Starrett. He is a graduate of Springfield College and has done graduate work at the University of Vermont. Mr. Deane has also been assistant professor of physical education at Norwich University and has served eight years in the education field.

Rotolite Sales Corp. Announces New Automatic Diazo Developer



A new wall-mounted, automatic, diazo developer, capable of handling prints up to 42" wide at a developing rate of 48" per minute, has been placed on the market by the Rotolite Sales Corporation.

The new developer, called the Thermomatic, features a heated roller which speeds action of the ammonia developer and gives good color tone on black-line as well as blue-line and sepia prints, the firm claims.

The unit weighs only 30 lbs. and can be desk or wall mounted.

For complete information write the firm at Stirling, N.J., mentioning SCHOOL SHOP; or *circle no. N-1 on the business-reply card.*

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A free torque wrench, available to shop teachers for classroom use for a handling and mailing charge only, is being offered by the P. A. Sturtevant Company.

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To take advantage of this offer, order C.O.D. on school letterhead from P. A. Sturtevant Company, School Shop Offer, Addison, Ill.; or write the company, enclosing $3.50 to cover handling and mailing costs. Specify first and second choice of torque range. Offer expires after 30 days.

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For complete information write to the firm, 2446 West 25th St., Cleveland 13, Ohio, mentioning SCHOOL SHOP; or *circle no. N-2 on the business-reply card.*

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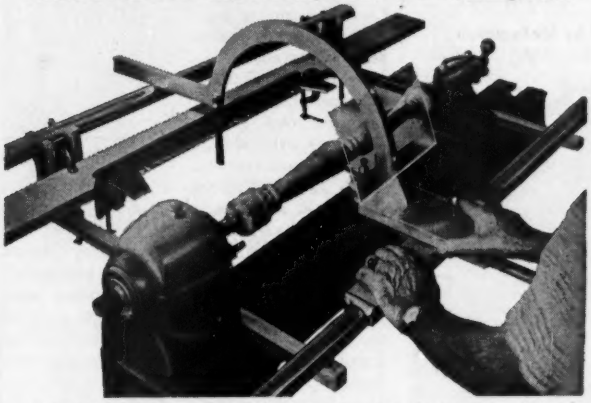

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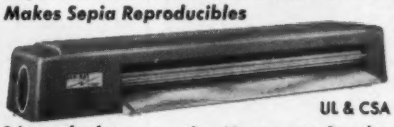

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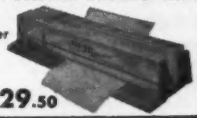

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T. A. FOLEY LUMBER CO., INC.

other metals where surface film is a problem, according to the firm.

For additional information about this product, contact the firm at Gillespie Airport, Santee, Calif., mentioning SCHOOL SHOP; or *circle no. N-3 on the business-reply card.*

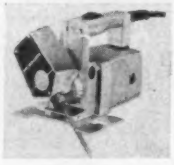
Melting Furnace Offered by McEnglevan Heat Treating and Mfg. Co., Inc.

A new melting furnace, Model B10-SM Soft Metal Melter, designed to fill the need for a ladle melting furnace in a general metals shop, was recently announced by the McEnglevan Heat Treating and Manufacturing Company, Inc.

The furnace is capable of melting aluminum, brass, and bronze in a short time. Features include: cast chrome iron melting ladle suspended through lid into chamber, pouring shank designed for ladle with each furnace, melting metal always visible, and direct pouring made possible by attaching pouring shank and lifting out ladle, according to the company.

For detailed information, write to the firm at 708 Griggs St., Danville, Ill., mentioning SCHOOL SHOP; or *circle no. N-4 on the business-reply card.*

Power Tool for Flush-Cut and Miter Sawing Announced by Milwaukee Electric Tool Corp.



The "Sawzitt," a new heavy-duty jig-saw featuring an adjustable pivoting head, has been placed on the market by the Milwaukee Electric Tool Corporation.

Compact and lightweight (5 lbs.), powered by a ¼-hp motor, the tool is designed to cut straight lines, curves, and intricate scrolls in practically any sawable material at a rate of 3,500 ¾" strokes per minute, the firm reports. Other features include full ball and roller bearings, sawdust blower, and excellent blade visibility.

A free bulletin, SW-37, containing complete information is available by writing to the firm, at 5368 West State St., Milwaukee 8, Wis., mentioning SCHOOL SHOP; or *circle no. N-5 on the business-reply card.*

New Aluminum Etching Plates Developed by Rembrandt Graphic Arts Co., Inc.

A new pre-coated aluminum plate has been placed on the market by the Rembrandt Graphic Arts Co., Inc.

Designed to simplify the plate-etching process, neither solid nor liquid ground is necessary. The design is scratched on the surface with a needle and is etched by a solution of etching powder and water that is harmless to the hands. It is nonpoisonous, according to the company.

For complete information, write to the company at Stockton, N. J., mentioning SCHOOL SHOP; or *circle no. N-6 on the business-reply card.*

New Design Safety Shop Coat Offered by Can-Pro Corp.

A new shop coat designed to minimize possibiliiy of accident has been introduced by Can-Pro Corporation.

Of cotton washable material, available in all sizes from 34-56 in a range of six colors, the new coat is designed to stress safety, durability, and comfort. With tapered safety sleeves, straight back with no belt, angle pockets without flaps, the company reports every possible hazard has been eliminated.

To receive a free circular containing complete information about this product, write to the firm at Fond du Lac, Wis., mentioning SCHOOL SHOP; or *circle no. N-7 on the business-reply card.*

Skil Corporation Introduces Heavy-Duty Pistol-Grip Drill

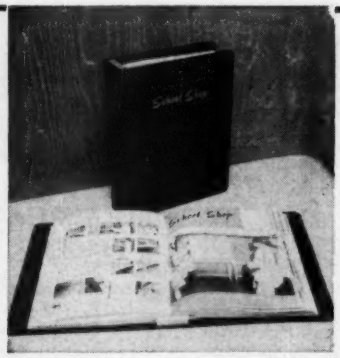
The Skil Corporation recently introduced a new Model 79, ½" drill that employs a heavy-duty, compact chuck to fill the need for a compact, pistol-grip drill capable of drilling holes up to ½" diameter in metal, up to 1" in wood, and, using hole saws, even larger holes.

The drill weighs 4½ lbs., has an over-all length of 8¼", features ball and needle bearings and precision cut gears. A 3-amp motor provides 500 rpm at no load and 300 rpm at full load. It is also available with 750 rpm or 1000 rpm at no extra cost, the firm reports.

For more information write to the firm, 5033 Elston Ave., Chicago 30, Ill., mentioning SCHOOL SHOP; or *circle no. N-8 on the business-reply card.*

LaFayette Radio Electronics Corporation Adds New Test Instruments to Line

The LaFayette Radio Electronics Corporation recently announced the addition of a C.R. Analyzer (TE-25), a sine square wave audio generator (TE-23), a cathode rejuvenator tester (TE-19), and a new precision marker generator (TE-24) to its line of quality test instruments. The firm also introduced a new, low-cost, AM-shortwave broadcast radio,



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Please send your free catalog of enameling and craft supplies.

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Address_____

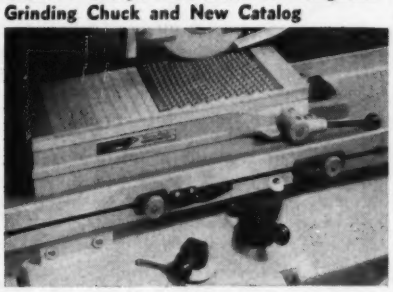
City_____ **Zone**_____ **State**_____

named the FS-231. The TE-23 is shown (p. 44).

Precision, range, easy-to-read dials, and attractive cases are some of the features incorporated into design of the new instruments, the firm reports.

For detailed information about these products, write to the firm at 165-08 Liberty Ave., Jamaica 33, N. Y., mentioning SCHOOL SHOP; or *circle no. N-9 on the business-reply card.*

Brown & Sharpe Introduces New Magnetic Grinding Chuck and New Catalog



A new "Micro-Mesh" permanent magnet chuck for surface grinders that permits machining of thin stock (from .001″), and a 20-page, illustrated, condensed catalog of the entire line of machine tools were announced recently by the Brown & Sharpe Mfg. Co.

The new chuck has a 6″ x 18″ working surface, 6″ x 15¾″ magnetic surface, and 6″ x 18″ base dimensions. Height is 2½″. A holding power of 2½ psi uniformly distributed over the magnetic surface is claimed by the company.

The catalog presents information about the company's entire line of machine tools, accessories, and equipment and other products and services.

To receive the catalog or for additional information about the products, write the firm, Providence 1, R. I., mentioning SCHOOL SHOP; or *circle no. N-10 on the business-reply card.*

New Versatile Machine-Tool Space Blocks Announced by Montgomery & Co., Inc.

A new set of machine-tool space blocks is now being offered by Montgomery and Co., Inc.

There are 34 blocks in the set covering a range from .0001″ to 2″. The blocks are hardened and lapped to an accuracy of plus or minus .0001″, the company claims.

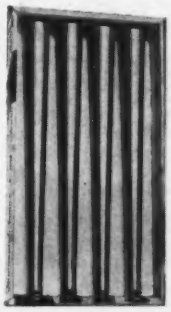
For further information on this and other items, write to the firm at 401 Morris Ave., Springfield, N. J., mentioning SCHOOL SHOP; or *circle no. N-11 on the business-reply card.*

New Proof Presses and Furnace Design Booklets Offered by Nolan Corporation

A new line of proof presses designed to produce high-quality proofs, and featuring motor-driven inking units claimed to cut inking time by 90 percent, was placed on the market recently by the Nolan Corporation.

The presses are available in two bed sizes: 15¼″ x 34½″; and 25¾″ x 42″. Adjustable feed fingers accurately guide the paper; the end register cam instantly adjusts feed rollers to engage paper between feed bar and cylinder, holding paper flat for inspection; and an integral compensator adjusts impression to various paper thickness, with throw-off to lift cylinder clear for return stroke. These and other improvements make it possible to produce high-quality proofs in less time, the firm claims.

Also, a 20-page illustrated *Engineering Guide* reviews specification and engineering



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Bedford Lumber Co., Inc.
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data of remelt and stereo furnaces made by the firm.

To receive the booklet or for additional information about the products, write to the firm, Rome, N.Y., mentioning SCHOOL SHOP; or *circle no. N-12 on the business-reply card.*

New High-Capacity Torque Wrench Introduced by P. A. Sturtevant Company

A new torque wrench providing direct readings up to 600 foot-pounds is now being marketed by the P. A. Sturtevant Company.

The wrench is constructed so that the operator need apply only 120 lbs. of pressure to obtain 600 foot-pounds of torque. The wrench weighs less than 17 lbs., has a quick-disconnect center section for easy storage or shipping, and a signaling device that sounds and imparts a pulse to the operator's hand when desired preset torque is reached, the company states.

The unit comes with a ¾" square male drive. Adapter ends and accessories are available.

For complete information write to the company, Addison, Ill., mentioning SCHOOL SHOP; or *circle no. N-13 on the business-reply card.*

Foley Mfg. Company Introduces New Circular Saw Setter

A new circular saw setter designed to achieve speed, accuracy, and operating convenience by means of a precision trip hammer is now available from the Foley Manufacturing Company.

The reversible hammer has a narrow, tapered striking surface on one end and a blunt surface on the other. The force of the hammer blows may be adjusted from light to heavy. These and other features permit the new setter to accomodate all circular saws from 5" to 38" diameter and from ½" to 2½" arbor hole, according to the company.

For more information write the firm, 3300 Fifth St., N.E., Minneapolis 18, Minn., mentioning SCHOOL SHOP; or *circle no. N-14 on the business-reply card.*

New Literature:

Arcair Torch Instruction Manual is a pocket-sized, 32-page booklet containing complete information about the Arcair Company's process for cutting metals. Operating instructions for the firm's line of cutting torches are included. Drawings, illustrations, and step-by-step procedures are used to present maintenance, operating, and repair instructions.

The manual is free to shop teachers by writing to the company, P.O. Box 406, Lancaster, Ohio, mentioning SCHOOL SHOP; or *circle no. N-15 on the business-reply card.*

Form-All is a large, six-page, illustrated, three-color folder describing bending brakes, and the principles employed in metal bending machinery manufactured by the Lake Erie Machinery Corporation. The bulletin (No. 26-16) is available by writing the firm, 600 Woodward Ave., Buffalo, N. Y., mentioning SCHOOL SHOP; or *circle no. N-16 on the business-reply card.*

Hydrolairs and **Metal Shop Instructors Ordering Guide** are two new South Bend publications available free to shop teachers.

The first is an eight-page, two-color catalog containing illustrations, specifications, and

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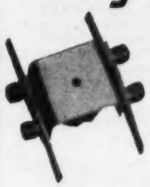

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ordering information concerned with a complete line (30 to 100 ton) of air-powered and hydraulic presses.

The ordering guide is a 30-page catalog illustrating and describing the complete line of metal-working tools and accessories available from South Bend Lathe, Inc. The guide also includes information about special services the firm offers to shop instructors.

For your free copies, write to the firm, South Bend 22, Ind., mentioning SCHOOL SHOP; or *circle no. N-17 on the business-reply card.*

Solution for crossword puzzle on page 36.

F	A	R	■	■	■	K	■	■	■	T	R	I	P	
I	■	■	G	■	T	O	N	E	S	■	I	■	■	I
B	E	A	R	E	R	■	I	■	E	Y	E	■	A	C
E	M	■	I	■	A	■	F	■	T	■	■	I	N	K
R	■	P	P	■	P	R	E	S	S	M	A	N	■	■
S	L	I	P	■	■	E	■	■	■	■	■	C	A	M
■	I	■	E	■	P	A	■	B	R	U	S	H	■	A
O	V	E	R	■	■	M	I	■	O	■	S	■	P	T
■	E	■	■	J	■	P	■	L	■	C	■	■	■	S
B	■	■	W	O	O	D	P	U	L	P	■	■	C	■
A	■	O	O	■	B	&	■	E	■	■	F	E	L	T
S	C	O	R	E	■	M	A	■	R	■	I	■	A	■
E	■	■	K	■	A	■	U	■	S	P	R	A	Y	■
■	S	L	U	R	S	■	■	■	■	■	E	■	■	■
■	■	■	P	■	K	R	A	F	T	■	D	O	T	S

Washington . . . *from page 52* merely postpones action until a later date. The training bill, which is expected to greatly enlarge adult vocational-education programs, will therefore be pushed — and probably passed — early next year. It has been promoted, however, as one answer to high unemployment, and if the recession is replaced by a boom next spring, some Congressmen might lose interest in the economic potential of vocational training and retraining.

Wages and Hours.—The Labor Department has adjusted the minimum-wage rates for student-learners enrolled in vocational-training programs in the light of the new minimum-wage provisions of the Fair Labor Standards Amendments of 1961, which became law on Labor Day. Since then, student-learners must be paid at least three-fourths of the applicable statutory or wage-order minimum under the Fair Labor Standards Act. The previous rate was not less than 75 cents an hour outside of Puerto Rico and the Virgin Islands, where the rate was not less than three-fourths of the applicable wage-order minimum.

Employers of student-learners may continue to take advantage of the exemptions in certain hazardous occupations orders provided for student-learn-

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Black or White Headgear. Clear, Light Amber or Light Green Face Protector. Write for Catalog and School Discounts

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Professional results without special equipment or chemicals.

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The dowel center with the extra top lip for easy removal. Set #24 (10 centers) 1 pr. of ea. ¼", 5/16", ⅜", 7/16", ½" in a plastic box, $1.25 Ppd.; 2 sets $2.25 Ppd.

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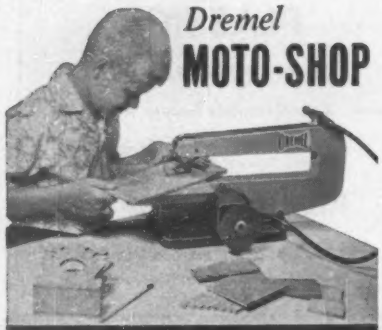
Dremel
MOTO-SHOP



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Write for catalog and name of nearest craft dealer.

DREMEL MFG. CO. Dept. 131-K, Racine, Wis.

134

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ers. Orders Nos. 5, 8, 12, and 14 permit 16-year-old and 17-year-old student-learners to work part time in the occupations declared hazardous when there is a written agreement between the employer and the school official setting forth the safeguards that must be met under the orders. These orders cover the operation of woodworking machines, metalworking machines, paper-products machines, and power-driven circular and band saws.

Many student-learners currently enrolled in vocational training programs now require certificates, which were not needed in the past because their work was not covered under the Act, or because the student-learners were paid between $1.00 and $1.15 an hour in work now subject to the Act. For such students, in lieu of the ordinary certification requirements, their employment may continue until January 31, 1962, on the basis of a statement from the appropriate school official, in the files of the employers, that the employe is employed as a "student-learner" under a "bona fide vocational-training program." These student-learners must be paid at least three-fourths of the applicable statutory minimum, and a copy of the statement from the appropriate school official must be filed with the nearest regional office of the Wage and Hour and Public Contracts Divisions.

Full text of the Labor Department's action may be obtained without charge from the Wage and Hour and Public Contracts Divisions, Department of Labor, Washington 25, D.C.

AVA Convention.—HEW Secretary Abraham A. Ribicoff and Education Commissioner Sterling M. McMurrin will both address the annual AVA Convention, according to Dr. M. D. Mobley, AVA Executive Secretary. The Secretary is scheduled to speak on Monday, December 4, and the Commissioner the following day. Either or both may shed light on the methods and objectives of the high-level committee to be appointed soon by the President to restudy and rethink the federal vocational-education programs. By the time the AVA meets in Kansas City, Missouri, next month, the President's committee will probably have gotten its work under way.

White House Rocker.—A wooden rocking chair handcrafted by an Olathe, Kansas, high-school student has been presented for use at the White House as a sample and symbol of the skills young Americans learn in their

(*Continued on page* 50)

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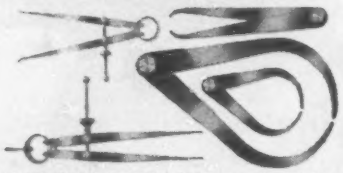

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The solid walnut, upholstered platform rocker was made by 17-year-old Thomas A. Brown, an 11th-grader at Olathe High School. The walnut was cut from a tree in his home town and dressed by his woodworking teacher, M. H. Ensor. After presentation of his prize-winning entry, Thomas was taken on a special tour of the White House. Now he's building a grandfather's clock similar to one he spotted while visiting the President's home.

AIAA President William J. Micheels (left) and AIAA Executive Secretary Kenneth Dawson admiring the platform rocker that was presented to President Kennedy. Working drawings for making this rocker first appeared in SCHOOL SHOP, December, 1959, page 11.

Critical Occupations.—Heightened international tensions and call-up of military reserves have again made timely the Labor Department's "List of Critical Occupations for Screening the Ready Reserve." The list serves the

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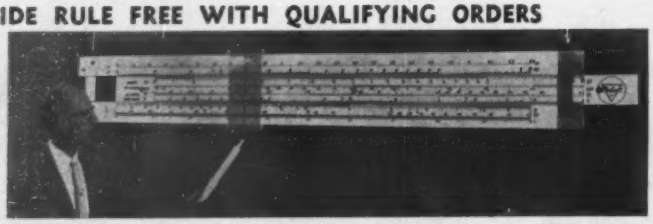

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armed forces as a guide for transferring certain skilled personnel from the Ready Reserve (subject to an immediate call in an emergency) to the Standby Reserve (not subject to immediate call if employed in defense-supporting industry).

Among six occupations recently added to the list is Technician in Engineering and Physical Science. Vocational-education administrators wishing copies of the newly revised list should write to the Secretary, Interagency Advisory Committee on Essential Activities and Critical Occupations, Department of Labor, Washington 25, D.C. ★

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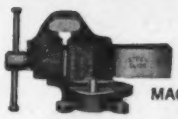

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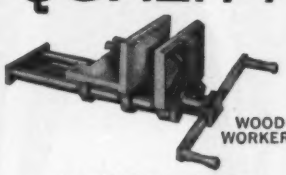

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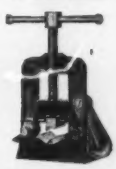

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by Theodor Schuchat

Setbacks and Gains.—Before adjourning until January, Congress took three major actions affecting vocational education. First, the House of Representatives rejected federal aid for school construction by a lopsided vote of 242-169. But when it killed this controversial proposal, the House also killed aid to the so-called "federally impacted areas," a program which channels aid to about one-third of the nation's school children. The killed bill would also have extended the National Defense Education Act, which was scheduled to expire at the end of June, 1962. The AVA especially recommended early extension of the law so that administrators of area vocational-education programs would know next spring that they would be fiscally able to renew teachers' contracts, etc. If Congress waited until next year to renew NDEA, action might come too late in the spring to hold staffs together.

It was, therefore, necessary for Congress next to retrace its steps and enact the portions of the rejected bill that had been expected to attract enough votes to assure passage. Strong supporters of federal aid argued for a one-year extension of NDEA and aid to impacted areas, on the theory that another effort could thus be made next year to enact a general federal-aid bill. Others took the position that the margin of defeat in the House was so great that it would be necessary to await the outcome of the 1962 Congressional elections before attempting to enact general federal aid. If school-aid supporters increase their strength in the House in 1962, according to these Congressmen, then 1963 will be the year to try again to enact the long-sought, general, federal-aid measure.

The House quickly passed a two-year extension of NDEA and aid to impacted areas, but the Senate wavered for two days between a one-year and a two-year extension. President Kennedy asked for a one-year extension in a letter read twice on the floor of the Senate, but the vote went against him, 45-40. Although reluctant to vote against the President, many Senators felt that the House had forced their hand. Under the rules, if the Senate bill was not identical with the House bill, then the differences would have to be compromised by a conference committee. But it would take only one dissenting Representative in the House to block appointment of a conference committee, and there was certain to be at least one die-hard opponent of any form of federal aid to education who would welcome an opportunity to object.

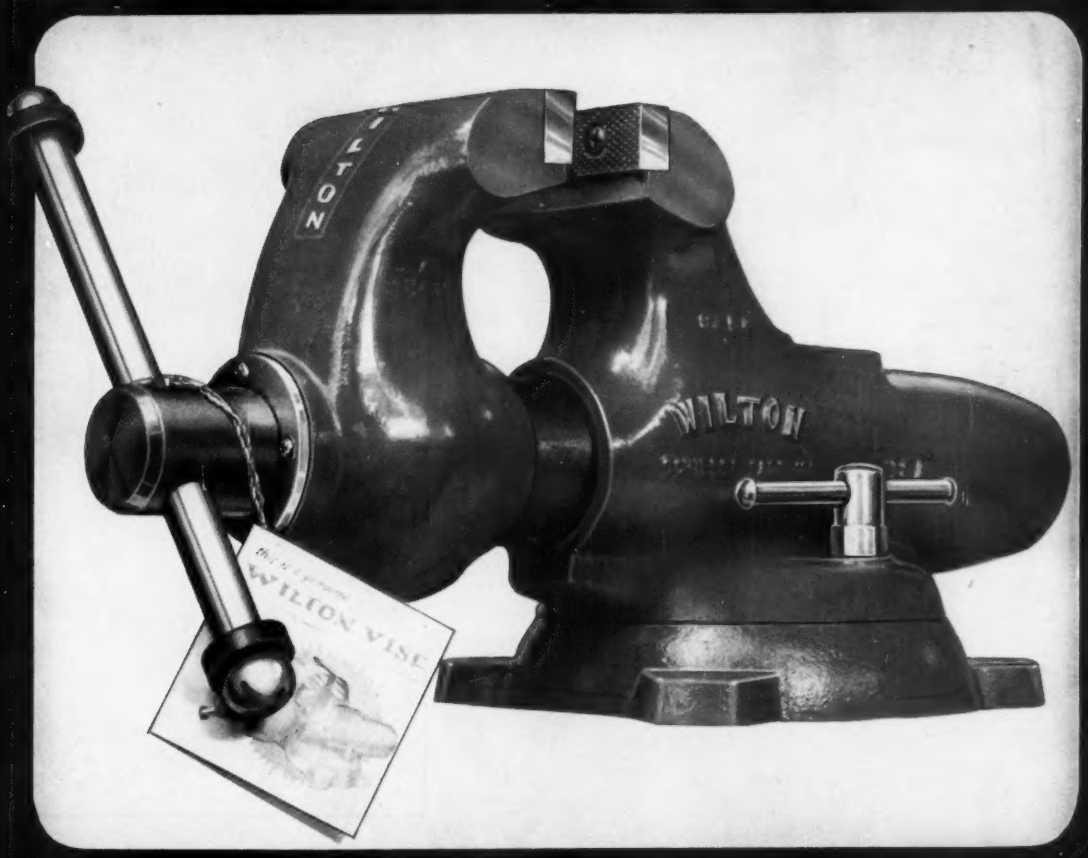
And so the NDEA with its support of area vocational-education programs was extended until June 30, 1964. By agreeing to a two-year extension, educators were probably foregoing any chance to improve the legislation until the Eighty-Eighth Congress convenes in January, 1963, because it is extremely unlikely that Congress will enact any major legislation next year affecting NDEA. On the other hand, NDEA will come up for extension just before the Presidential nominating conventions in 1964, a strategic time for a Congressional decision.

The third Congressional action affecting vocational education was a setback, but probably only a temporary one. It involved President Kennedy's proposal for a massive federal program of grants to states for training and retraining the unemployed and underemployed. The measure was passed enthusiastically by the Senate, 60-30, where Republicans tried unsuccessfully to limit the new grants to a two-year "experimental" period. The House Education and Labor Committee, taking note, trimmed the life of the bill from four years to two in the hope that this would attract much-needed Republican support in the House.

The Rules Committee, which had pigeonholed general federal aid for a while by an 8-7 vote, was not expected to be a problem. Rep. James J. Delaney (D-N.Y.), who had deserted the President on the general-aid bill, had promised to support the Administration's training bill. But the Rules Committee's seven Republicans voted solidly against the bill, and only seven of the Committee's eight Democrats were on hand to vote for it. The eighth, Rep. Ray Madden (D-Ind.), was unavoidably absent because of a death in his family.

Fortunately, a tie vote in the Rules Committee does not defeat a bill but

(*Continued on page* 47)



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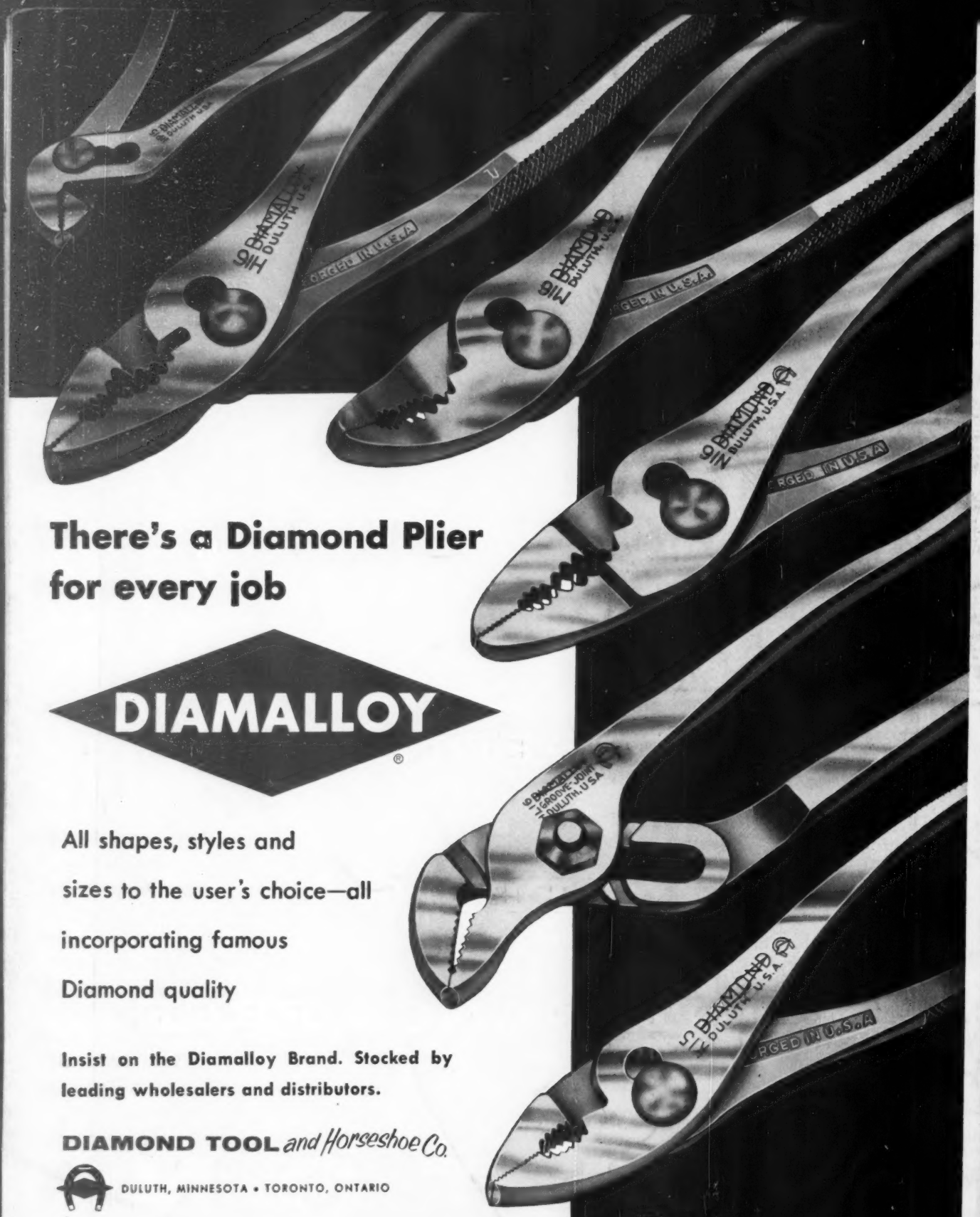

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